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FIRST SUPPLEMENT
January, 1946—July, 1947

LITERATURE SEARCH
on the
PRESERVATION OF FOODS BY FREEZING

By
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Table of Contents

	Page
Preface	v
Literature Abstracts	407
A 407	M 518
B 446	N 534
C 460	O 539
D 471	P 541
E 477	Q 549
F 479	R 550
G 484	S 557
H 489	T 572
I 500	U-V 582
J 501	W 584
K 505	Y 598
L 512	Z 600
Foreign Patent Abstracts	602
British	602
German	603
United States Patent Abstracts	604
Index	613

Preface

This search of the literature for January, 1946, through July, 1947, on the preservation of foods by freezing has been prepared in an effort to bring up to date the Georgia Tech Engineering Experiment Station's Special Report No. 23, which deals with the literature prior to 1946. As does this first volume, it forms part of the long-term research program in this field which is jointly sponsored by the Station and the Tennessee Valley Authority.

Food freezing continues to play an increasingly important role in the agricultural field, and more and more attention is being given to all aspects of the subject, from varietal selection to retail sales. Some idea of the vast amount of work being performed may be gained from a consideration of the number of references included in this 1½-year search--1288--as compared with 2095 references included in the first search for all the years prior to 1946. While it is certain that neither search contains all the references that have appeared--some 500 were deliberately omitted from this supplement because of their minor significance--this comparison is of at least qualitative significance. While many articles are of a review type, and many authors write on the same aspects, often with only slight contributions of original data, it is clearly evident that much needed research is in progress.

Scope of Search

The literature sources employed in this search were numerous, as an effort was made to obtain all pertinent references, including those which had been missed in the preparation of Special Report No. 23. The first journal consulted was Chemical Abstracts, for which the index for the year 1946 was searched under the following topics: antifreeze, bacteria, berries, blanching, cereals, cooling, cooling apparatus, digestibility, eggs, fish, foods, freezing, frozen foods, fruit, fruit juices, meat, milk, packaging, refrigerating apparatus, and refrigeration. In addition, each separate issue was searched through July, 1947, under the same subjects. Pertinent abstracts were then selected for inclusion in this report.

Biological Abstracts has published no index for either 1945 or 1946; therefore, separate issues were searched for 1945 through June-July, 1947, by consulting the following main section headings: Apparatus and Technique; Enzymes and Catalysts; Animal Physiology, Nutrition, and Metabolism--Food Technology; Food and Industrial Microbiology; and Horticulture. In the Engineering Index, a search was made in the 1945 and 1946 volumes under the listings: agricultural engineering--refrigeration; canning and preserving; cold storage plants--lockers; containers; eggs; food products--containers, fish, fruit, meat, preservation, storage, transportation, vitamins; infrared heating; low-temperature engineering; materials testing--low temperature; meat; milk; packaging--frozen foods; refrigeration--fish, food products, fruit, low-temperature, meat, poultry, vegetables; refrigeration engineering; research laboratories; ship refrigeration; storage; transportation; vegetables; and vitamins. Pertinent abstracts were obtained from both these sources.

A new quarterly abstract journal, Refrigeration Abstracts, was carefully searched through Volume 1 (1946) and the first three issues of Volume 2 (1947), under the following section headings: Codes, Standards,

Laws; Engineering; Engineering Materials; Food; General; Machinery and Equipment; Natural Sciences; Patents; Refrigeration Applications; and Refrigerating Mediums. No index has yet been published; however, the search was made in a comprehensive manner, since the numerous cross-references at the end of each "food" division were carefully checked in addition.

In an effort to obtain more references to foreign work being performed, a search was made through several other abstract journals. British Abstracts was checked from January, 1941, through March, 1947, with concentration on Section BIII, "Agriculture, Foods, Sanitation." A few cross-references were found to Section BI, "Chemical Engineering." No index was available. Another British journal, Nutrition Abstracts and Reviews, was carefully searched in the section, "Technique: Cooking, Sterilization, and Preservation of Food," in each of Volumes 13, 14, and 15, and in the first three issues of Volume 16 (July, 1943, through April, 1947). A new periodical of the U. S. Department of Commerce, the Bibliography of Scientific and Industrial Reports, was checked through Volumes 1-5 (1946-47) and the first three issues of Volume 6 (1947). The indices for Volumes 1 and 2 were also consulted under: berries; blanching; containers; eggs; fish--frozen, Norway, Sweden; foods--dehydration, frozen, Germany, preservation, United States; fruits; meat; milk; packaging; vitamins. For the last four volumes, section headings searched were: Food and Kindred Products; Patents--food and kindred products; and Packing and Packaging.

The Industrial Arts Index was consulted under the following headings: blanching; blueberries; broccoli; cold storage--lockers; containers; cooling--of fruits and vegetables; eggs; fish--frozen; fish trade--Iceland; food, frozen; food factories--electric equipment, equipment; food packages; food research; Frozen Food Products, Inc.; fruit--frozen; fruit juices--preservation; lima beans--frozen; meat--frozen, storage; milk--frozen; orange juice--frozen; oranges--frozen; peaches; peas; poultry--frozen; raspberries; refrigeration and refrigerating machinery; spinach; strawberries; tomatoes; vegetables; and vitamins.

In addition, Volumes 8-10 and the first issue of Volume 11 of the Bibliography of Agriculture were consulted under the following index subjects: alfalfa--frozen; apples--freezing, frozen; apricots--freezing, frozen; bakery products--frozen; beans--freezing; beans, limas--freezing, frozen; berries--frozen; blackberries--freezing; blanching--equipment; blueberries--frozen; cauliflower--freezing; cherries--frozen, grading and standardization; citrus--freezing, frozen; corn--freezing, freezing equipment, frozen; corn, sweet--freezing; cream--frozen; eggs--freezing, frozen; fish--freezing, frozen; food--frozen; freezers; freezing of food; Frozen Food Express; fruit--blanching, freezing, frozen, juices and syrups (freezing); grapes--freezing; herring--freezing; high-frequency heating--in food processing; locker plants; meat--cooked frozen, freezing, frozen; milk--freezing, frozen; oranges, juice--frozen; peaches--freezing, frozen; peas--freezing, frozen; pineapples--freezing; potatoes--freezing; poultry--freezing, frozen; rabbits--frozen; raspberries--frozen; spinach--freezing, frozen; strawberries--freezing; tomatoes--freezing, juice (freezing); turkeys--frozen; vegetables--freezing, frozen.

A few additional references were obtained from a check of chapter bibliographies of the 1947 edition of The Freezing Preservation of Foods (3201) by D. K. Tressler and C. F. Evers. In addition, several other references were garnered from bibliographies found at the end of numerous articles and bulletins.

Direct reference was then made to the primary sources of those articles, bulletins, and books for which abstracts had not already been obtained, and abstracts were prepared as needed. A great many references located were of a rather general, nontechnical nature or of the news-release type. These were subsequently omitted from the final search, which has endeavored to maintain itself on a more technological and economic level.

In regard to patent references, these were chiefly obtained from the section devoted to patents in Refrigeration Abstracts and from Chemical Abstracts; the columns discussing recent patents in Quick Frozen Foods and Food Industries were also found to be helpful. As a final check for patents issued from January, 1946, through June, 1947, reference was made to the Official Gazette of the U. S. Patent Office. The index for 1946 was checked under the following subjects: blanching, eggs, fish, food, freezing, frozen foods, fruit, meat, milk, quick freezing, refrigeration, and vegetables. Separate issues for 1947 were checked chiefly under these class numbers: 62-102; 62-114; 99-103; 99-192; 99-193; 99-194; 99-195: 99-196; 99-197; 99-198; 146-228; 229-33; 312-36.

It should be noted that the patent abstracts are, as a rule, only "partial abstracts"; i.e., related primarily to one or two claims. However, it is probable that the dominant features of the patents have been relatively well covered in spite of the necessity for using this technique.

The literature references are arranged in order of the authors' surnames, following the Library of Congress' rules for alphabetizing; this necessitated a change from the original search in that the groups of "Anon.'s" are now located in order in the A's, and all Mac's and Mc's are grouped together in the position for Mac under the M's. Where more than one reference appears by the same author, these are arranged in chronological order; where several articles appeared in any one year, they are alphabetized under the name of each journal and then according to its pagination. The patents are arranged in numerical order under their respective country of issue. Source references are given for those abstracts which were obtained from Bibliography of Scientific and Industrial Reports (B.S.I.R.), Biological Abstracts. (B. A.), British Abstracts (Br. A.), Chemical Abstracts (C. A.), Engineering Index (E. I.), Food Industries (F. I.), Nutrition Abstracts and Reviews (N. A. R.), Quick Frozen Foods (Q. F. F.), Refrigeration Abstracts (R. A.), and the Official Gazette of the U. S. Patent Office (Off. Gaz.). Abstractors' initials are given for those abstracts which were prepared directly.

In order to facilitate the use of this Supplement, an attempt has been made to eliminate from the abstracts all the arbitrary abbreviations of English words which had been used by the various abstract journals. In addition, references to temperatures have been identified, whenever used, as "F.", "C.", etc. While definite rules for abstract forms were followed, incidentally, no attempt was made to change the abbreviations of journal titles used by the various abstract sources, since an untoward amount of work would have been required.

This volume contains all references located on the freezing of milk, eggs, and dairy products, subjects omitted from the previous search. As before, references dealing with locker plants, home freezing, etc., were included only when they contributed engineering or other new economic information of value to food freezing in general. No attempt was made to include all references to refrigeration. As the Station's research on food preservation progresses, it is quite likely that further supplements

to this and the original search will be required to keep them up to date and to include reference to previously unrelated subjects.

Index

The alphabetical subject index which appears at the back of this volume is based upon the abstracts themselves and is, therefore, only as complete as these are. An attempt has been made, however, to provide adequate cross-referencing, and it appears likely that few major omissions have occurred. Numbers listed in the index are abstract numbers, not page references; it may be noted that the abstract numbers are continued from the previous search. The alphabetizing of all index entries has followed the Library of Congress' rules, which involves a slight departure from the arrangement used previously. However, the exact wording of the index items in the previous search was used whenever possible, in order to facilitate use.

The practice of placing an asterisk beside each reference to a quick freezing process has been abandoned, in view of the fact that the great bulk of recent material deals with quick freezing.

Insofar as possible, all references to the freezing of specific items and the properties of the frozen products are collected under the items in question. In all cases, however, reference should also be made to such general classes as "Vegetables," "Fruits," "Packaging," "Storage," "Bacteria," "Vitamins," etc. A number of important subjects are also indexed under "Foods" and "Freezing"; freezing subjects are classified under the latter heading. Consultation of related subjects is recommended.

* * * * *

This search was prepared with the cooperation and encouragement of Dr. Frederick Bellinger and Assistant Professor T. W. Kethley, project director and assistant project director of the food freezing program of the Georgia Tech Engineering Experiment Station; Dr. Gerald A. Rosselot, director of the Station; and Dr. Paul Weber, assistant director.

The scope of the search is in large measure attributable to the searching, abstracting, and indexing of Betty Anderson, research assistant on the staff of the Station's Technical Information Division. Assistance in abstracting was given by Marjorie Bolen, A. S. Chapman, D. M. Gill, and Malcolm Patterson. Acknowledgement is also made to Dathine Brunson, Jean Quinn, and Nell Ross for their assistance in the preparation of the final copy.

The Station, through its Technical Information Division, has prepared this search as part of its program of organizing and making more readily available the information contained in the literature. This has already been attempted in the fields of food freezing, water and sewage analysis, dry cell batteries, and solvent extraction of oilseeds. An accelerated program is planned which, through the information provided, should aid in the development of better processes and products, thereby contributing to the welfare of Georgia, the South, and the nation as a whole.

B. H. Weil
Chief, Technical Information
Division

(2096) Abbott, F. P., "Southeast Offers Possibilities for Year Round Freezing." Quick Frozen Foods 8, No. 11, 71 (1946). - Fruits and vegetables available for the industry.

(2097) Abbott, F. P., "Railway Transportation of Frozen Foods." Sou. Canner & Packer 8, No. 5, 15, 18-19, 28 (1947). - From the conception of the frozen food industry's commercial pack in 1929, it has made rapid strides; so that in 1945, 1,967,800 pounds of materials were frozen, of which 738,-153,905 represent fruits and vegetables. The carlot movement required for this amount of frozen foods is estimated at 20,000 cars, a fact which will clarify the difficulties evidenced in transportation shortages. Commodity temperatures on loading must be zero in order to maintain an adequate holding temperature to insure the arrival of the shipments in good condition. It is also vital that refrigerated cars be loaded carefully so that air can circulate over, around, and through the boxes of frozen foods.

B. J. A.

(2098) Adams, J. R., "Packaging Food for Freezing. Protection against Loss of Moisture Is an Essential." American Cookery 52, No. 9, 42-47 (1947). - Careful packaging of frozen foods involves two major points: (1) selection of efficient material and (2) proper use of those materials. One of the most important requirements is that the finished carton be moisture-vapor-proof. Types of containers considered are tin cans, glass jars, and paper cartons; the latter have proved most successful. The different kinds of paper used for the inner wrapping, the outer carton and methods for wrapping the foods are discussed.

M. B.

(2099) Adams, J. R., "Freezing Corn-on-the-cob--A Montana Success Story." Frosted Food Field 4, No. 1, 2 (1947). - The corn is mechanically stripped of husk and silk as soon as it is picked, then blanched, packed in cellophane, and frozen at -20° F. It is stored at 0° F.

M. B.

(2100) Adams, J. R., "Nitrous Oxide Immersion Freezing Method. I-II." Frosted Food Field 4, No. 3, 4-5; No. 4, 18 (1947). - Immersion freezing in nitrous oxide offers many advantages over air blast and other methods used at present.

R. A. 2, 193 (1947).

(2101) Aiken, W. H., "Plastic Films for Packaging Frozen Foods." Frozen Food Ind. 2, No. 5, 24-5, 29-31 (1946). - A review of research on factors affecting durability and water-vapor transfer rate of plastic films (Pliolite, Pliofilm, Parlon, Parafilm, Cryovac). Low temperature characteristics of many plastic films can be greatly improved by proper compounding. Reduction of temperature reduces the water-vapor transfer rate of plastic films, due to reduction in vapor pressure, and on many films there is an additional reduction due to change in the basic water-vapor transmitting characteristics of the film material. At 0° F., many plastic films are so

resistant to the passage of water vapor that several years would be required for transmission of 1 g. of water through 100 square inches of film.
R. A. 2, 40 (1947).

(2102) Alberson, S. D., "Frozen Food Progress in Daytona Beach, Florida." South. Food Processing 2, No. 1, 10-11 (1947).

(2103) Alexander, A. K. S., "Quick Freeze and Table Birds." Farmer & Stockbreeder 61, 895 (1947).

(2104) Allen, C. D., "Colors for Food-wrapper Inks." Amer. Ink Maker 19, No. 2, 23-4, 53 (1941). - The toxicity of ink colors is discussed.
Br. A. BII, 159 (May, 1941).

(2105) Amberson, R., "Focus on Home Freezing." Pract. Home Econ. 24, No. 1, 14-5, 46, 48, 50, 52 (1946). - Data are presented on the advantages, capacity, purchase and operating costs of home freezers and holding boxes for the rural and urban home. Discussion is also included on the community locker.
M. B.

(2106) Anderson, D. H., "Refrigeration, Present and Future." Edison Elec. Inst. Bull. 15, No. 3, 83-5 (1947). - A discussion of the present and future of the frozen food business with emphasis on the Missouri Valley section of the country. Locker plant distribution, the regional education program, and frozen food clinics held were brought out. Statistics were gathered on average plant size, plant load, gross income per frozen-food locker, overhead, and processing fees. The author predicts that in order for frozen-food processing to expand in the postwar years, it will have to be run more efficiently to meet the demands of the public in a competitive way. The unlimited possibilities for refrigeration and frozen foods are discussed.
A. S. C.

(2107) Anderson, L. W. and Winter, J. D., "Frozen Fruits in Bulk Packages for Home Use." Minn. Farm & Home Sci. (Minn. Sta.) 3, No. 3, 2-3, 5 (1946).

(2108) Anderson, M. E., "Introducing Four New Freezing and Garden Peas." West. Canner & Packer 39, No 2, 81, 83 (1947). - Dark-green, "garden type" pods and berries of green peas for freezing were sought which had a determinate vine and a double pod habit of bearing, concentration of pods, or uniformity of season, hardiness, resistance to Fusarium wilt, and good flavor. Cross-breeding has yielded 4 new varieties with several or all of these qualities; they are Navajo, Victory Freezer, Bonner, and Oneida.
B. J. A.

(2109) Anderson, N. J, "Future of Quick Frozen Meats." Butchers' Advocate 121, No. 20, 10-2 (1947).

(2110) Andrews, J. C., "How Meat is Dehydrated in New Zealand." Food Indust. 18, No. 1, 32-3, 154, 156 (1946). - Frozen meat is supplied to cen-

tral dehydrating plant; after thawing, meat is precooked, ground, and trayed; concentrated broth is poured over it, and meat is dehydrated in a multiple-tunnel drier which operates on oross-draft principle; operation and control of dehydrator equipment; cooking operations; process flow-sheet for dehydration of meat is presented.

E. I. 1946, 431.

(2111) Anglada, J. A., "Tomorrow's (Frozen Food) Packages and their Merchandising Value in Display." Food Freezing 1, 220-21, 235 (1946).

(2112) Anon., "Freezing Salmon." Ice and Refrig. 1, 333 (1891).

(2113) Anon., "Micro-organisms and Rapid Freezing." Ice and Cold Storage 36, 41 (1933).

(2114) Anon., "Freezing Pacific Oysters." Pacific Fisherman 35, No. 6, 33-4 (1937).

(2115) Anon., "Aggressive Merchandising Campaign to Introduoe a Quick Frozen Packaged Shrimp." Fishing Gazette 57, No. 1, 24 (1940).

(2116) Anon., "Bluepoints Company Opens New $200,000 Oyster Plant--More Quick Freezing Seen." Ice and Refrig. 99, 349-50 (1940).

(2117) Anon.,"Comes the Portable Quick-Freeze Refrigerator." Market Grow. Jour. 67, 374 (August, 1940).

(2118) Anon., "Economy of Quick Freezing." Mod. Refrig. 45, No. 535, 174-5 (1942). - Discussion and statistios point out that quick-frozen foods are more economioal than fresh or canned foods to pack and store.

M. B.

(2119) Anon. Modern Foods for Modern Menus With Miracle Quick-Freezing. General Foods Corporation, New York, 1942. 35 pages. - Booklet, prepared for students and consumers; explains principles of quick-freezing and its nutritional advantages, and gives directions for cooking quick-frozen foods.

M. P.

(2120) Anon., "How the Army Prepares Frozen Foods." Quick Frozen Foods 6, No. 2, 22 (1943). - The use of frozen foods by the army eliminates much of the routine "KP" duty in the army kitohen and assures accurate yields and, therefore, simplified planning of meals. Statistics show that 89 per oent of the gross shipping weight of frozen foods is edible, as compared with 30 per cent for fresh vegetables and 43 per cent for canned vegetables.

M. B.

(2121) Anon., Explanation of Operation for Radiant Heat Root Peeler. United States Department of Agriculture, Bureau of Agricultural and Indus-

trial Chemistry, Western Regional Research Laboratory, Unnumbered Hectographed Bulletin, Albany, California, 1943. 8 pages. - This bulletin explains the principles of the radiant heat root peeler and gives details of Drawings Nos. C-79A and C-80A, which are design sheets.

B. J. A.

(2122) Anon., Information Sheet on Production of Major Fruits in the United States. United Stated Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, Western Regional Research Laboratory, Mimeographed Ciroular AIC-16, 1943. 44 pages. - Maps show major production areas for apples, apricots, berries, cherries, citrus fruits, grapes, peaches, pears, and prunes, and tables give a summary of commeroial production and utilization, and harvesting seasons and principle varieties grown, in each state, with a production summary for major producing areas as of 1939.

M. P.

(2123) Anon., Making Velva Fruit at Home. United States Department of Agriculture Bulletin AIS-22, Washington, 1943. - An illustrated pamphlet showing the housewife how to prepare Velva fruit from fruit puree.

M. P.

(2124) Anon., Picking and Trimming Table. United States Department Agriculture, Bureau of Agricultural and Industrial Chemistry, Western Regional Research Laboratory Drawing No. D-116, Albany, California, 1943. - Detailed drawings of loading, intermediate, and discharge unit of picking and trimming table.

M. P.

(2125) Anon., Sources of Preparation Equipment for Food Dehydration. United States Department of Agrioulture, Bureau of Agricultural and Industrial Chemistry, Western Regional Research Laboratory, Unnumbered Heotographed Bulletin, Albany, California, 1943. - Contains list of manufacturers of blanching equipment, graders, sorters, huskers, juicers, peelers, pitters, shellers, tables, washers, etc.

(2126) Anon., Tray Loading and De-traying Tables. United States Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, Western Regional Research Laboratory Drawing No. D-108, Albany, California, 1943. - Elevations and seotion drawings of a tray loading table, side wheel conveyor, de-traying table, and tray-transfer table.

M. P.

(2127) Anonymous, "Velva Fruit." Food Packer 25, No 5, 30-1, No. 6, 60, 62, 64 (1944). - "Velva Fruit", a new frozen fruit dessert developed by the U.S.D.A. Western Regional Laboratory, is composed of fruit puree (fresh or frozen), sugar, gelatin (as a stabilizer), and, when desirable, oitrio aoid; smooth texture is obtained in an ice oream freezer and a volume increase of about 100%. Sweetening agents and stabilizers are discussed.

D. A. 20, 1622 (1946).

(2128) Anon., "Postwar Frozen Food Problems." Ice & Refrig. 107, No. 6, 61-2 (1944). - Current developments and future trends in frozen foods in-

dustry as reported at meeting called in October, 1944, by Department of Agriculture and War Food Administration attended by merely 100 representatives of refrigerated equipment manufacturers, frozen food packers and distributors, retail food organizations, and government agencies.
E. I. 1945, 920.

(2129) Anon., "Freezing Pumpkin Pie Puree." Quick Frozen Foods 6, No. 7, 30 (1944).

(2130) Anon., "How Chow Mein is Frozen." Quick Frozen Foods 6, No. 10, 29, 42 (1944).

(2131) Anonymous, "Cold Storage Studies of Citrus Fruits. (Work done by A. L. Stahl)". Rept. Fla. Agric. Expt. Sta., 67-8 (1944). - Juice of oranges, grapefruits, tangerines, and limes is concentrated by freezing out the water to a slush state and then centrifuging. Frozen blocks or briquettes are then stored at 0° F. No change in color or taste was noted when juice stored 2 years was reconstituted by adding water. 85 per cent of ascorbic acid content is retained in the frozen product.
B. J. A.

(2132) Anon., "Six Shaker-type Freezers Speed Pea Operations for Cedargreen's Plant." West. Canner & Packer 37, No. 6, 47, 49 (1944).

(2133) Anon., Freezing Table Book of Explanation, Information, and Discussion of the Quick-Freezing Industry. Second Edition. Off. Pub. Bd., Report, PB 3516, 1944. 180 pages. - This book was published in connection with the four-year plan by permission of the Reichministry for Nutrition and Agriculture, the Commercial Organization for Nutrition and Minister President, Reichmarschall Göring. The book covers fundamentals for the freezing of food, packing and shipping frozen food, installation of refrigeration units, management, and the preparation and use of such quick frozen foods as: meat, fats, eggs, fish, fruits, vegetables, and fruit juices.
B. S. I. R. 1, 267 (1946).

(2134) Anon., Information Sheet on Brine Peeling of Various Root Vegetables. United States Department of Agriculture, Bureau of Agriculture and Industrial Chemistry, Western Regional Research Laboratory, Mimeographed Bulletin AIC-1, Albany, California, 1944. - Describes the procedure to be followed and the equipment used; reference is made to USDA Drawings Nos. D-109 and D-111.

(2135) Anon., Vegetable and Fruit Dehydration. A Manual for Plant Operators. United States Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, Miscl. Pub. No. 540, Washington, 1944, 218 pages. - A detailed manual including sections on plant lay-out, equipment, and investment, storage, handling, preparation, blanching, sulfurization, and dehydration of fruits and vegetables. A discussion of the mechanism of drying precedes a description of various types of drying apparatus and dehydrators. Packaging equipment and methods, sanitation, insect control, and laboratory procedures are discussed.
M. P.

(2136) Anon., "Frozen Batters and Doughs." Amer. Baker 13, No. 5, 27 (1945); Bakers D. 19, 100, 111 (1945). - It was more practical to make raw pies com-

plete with filling, before freezing, rather than freeze the rolled pastry dough and fill and cook later, or to freeze the precooked pies. The maximum storage life of bakery products ranges up to 12 months, but usually is less than 6 months.

R. A. 1, 40 (1946).

(2137) Anon., "Into Frozen Foods; Department Stores Explore Field Through Researches of Frozen Food Foundation." Business Week, 88 (December 1, 1945). - Since the frozen foods industry is still so new that many of the answers to its problems can be provided only by original research, particular significance is attached to the opportunity which numerous leading department stores have had to explore the field through the research services of Frozen Food Foundation, Inc. The foundation group has been experimentally reaching down the income scale in the sale and rental of home freezer-storage cabinets, and in the merchandising of frozen foods. It is now attempting to determine the practicability of freezing surplus produce from terminal markets, much of which surplus is now wasted.

A. S. C.

(2138) Anon., "Delivered Frozen; New Food Merchandising Set Up." Business Week, 94 (December 8, 1945). - United Frozen Food Distributors, Incorporated, a newly formed New York Company, is out to adapt appliance sales techniques to the frozen food merchandising field. Plans are being promoted for nation-wide distributorships which will sell zero-temperature storage cabinets and provide the trappings of specialized frozen food merchandising.

A. S. C.

(2139) Anon., "Locker Plants Become Refrigeration Stores; Could Offer Variety of Services." Elec. World 124, 170 (October 8, 1945). - The steady growth in popularity throughout the country of frozen food locker plants and the increase in the essential services preformed by mechanical refrigeration have led mechanical refrigeration industry leaders to envision "general refrigeration stores" or "cold centers" serving entire communities in an unlimited number of ways.

A. S. C.

(2140) Anon., "Freezing Shrimp at Sea." Fishing Gazette 62, No. 8, 86 (1945).

(2141) Anon., "New California (Frozen Food Locker) Plant Designed for Efficient Operation." Food Freezing 1, 56-8 (December 19, 1945).

(2142) Anon., "Fresh and Frozen on Same Delivery." Food Ind. 17, 1160-61 (1945). - Truck bodies with separate compartments maintaining different temperatures permit delivery of fresh fish, as well as frozen fish, fruit, and vegetables.

R. A. 1, 101 (1946).

(2143) Anon., "Controlling Bacteria in Freezing Peas." Food Pkr. 26, No. 5, 68-70 (1945). - Brief discussion by specialists of the Western Regional Research Laboratory (USDA) of critical processing phases which relate to quality: varieties, effect of maturity, effect of delays, blanching, sanitation, and bacteriological control. Specific recommendations are given.

R. A. 1, 34 (1946).

(2144) Anon., "Processing Frozen Peaches and Apricots With Ascorbic Acid." Food Packer 26, No. 12, 38-40 (1945). - Directions are given for using ascorbic acid in frozen peaches and apricots for retarding enzyme-catalyzed oxidative changes. Sirup and dry sugar packs are discussed as well as packaging and labeling.

C. A. 40, 1951 (1946).

(2145) Anon., "Automatic Equipment to Speed up Frozen Food Packaging." Food Pkr. 26, No. 13, 30-1 (1945).

(2146) Anon., "New Army Cold Storage Plant Features Rapid, Precise Handling of Goods." Ice & Refrig. 108, No. 1, 18-20 (1945). - Details of plant constructed by U. S. Army Engineers, San Francisco District; plant will be operated by San Francisco Quartermaster Market Center handling perishable foods for Armed Forces and Lend Lease Administration; design and construction; insulation; refrigeration equipment; with exoeption of special freezing room, refrigeration is applied by circulating calcium chloride brine; illustrations.

E. I. 1945, 234.

(2147) Anon., "Seafood Processing Concern Equips Refrigerated Barge for Carrying Frozen Fish." Ice & Refrig. 109, No. 4, 26 (1945). - A barge, towed by a tugboat, is used to transfer fish from one plant to another, or from an isolated plant to a railhead.

R. A. 1, 102 (1946).

(2148) Anon., "Food Freezer Makes Peacetime Jobs in Brownsville, Texas." Ice & Refrig. 109, No. 5, 17-9 (1945). - Description of food freezing plant of Pan-American Freezers, Limited; products are frozen in two tunnels approximately 15 feet wide, 70 feet long, and 10 feet high with high velocity air circulated around over-head coils and then through packages placed on shelf trucks; above truck space is bank of $1\frac{1}{4}$-inch flooded ammonia coils running length of tunnels; Frick 2-stage ammonia refrigerating system with liquid intercooler installed.

E. I. 1945, 920.

(2149) Anonymous, "Use Ascorbic Acid to Blanch Apricots and Peaches." Ice Cream Field 46, No. 3, 51 (1945). - A new process for apricots and peaches, which utilizes ascorbic acid in place of steam blanching, preserves the natural freshness and flavor of fruit, and prevents discoloration at the time of defrosting.

B. A. 20, 1092 (1946).

(2150) Anonymous, "Oklahoma Has a New Locker Plant Law." Locker Operator 6, No. 11, 26, 52-4 (1945). - Plans for proposed locker plants must be submitted to State Board of Health for approval before construction is started. A temperature of 0° F. is required in the locker rooms. A recording thermometer is also required for the locker rooms. The law is similar to the 1942 Illinois law.

R. A. 1, 46 (1946).

(2151) Anon., "What It Costs to Run a Locker Plant or, Profits to be Expected." Locker Operator 6, No. 12, (1945). - Comprehensive reports on 20 Il-

linois cooperative locker associations for 1943 and 1944 are analyzed and broken down into the economic factory affecting the operation of such plants

R. A. 1, 98 (1946).

(2152) Anon., "Tennessee Institute's Regulatory Law (for Refrigerated Locker Plants)." Locker Operator 7, No. 2, 68-9 (1945). - The act specifically mentions requirements for licensing, adequate protection of food stored, sanitary plant conditons, and temperature to be maintained in the sharp freeze, locker, and chill rooms.

R. A. 1, 104 (1946).

(2153) Anon., "Regulations Governing Construction, Equipment, & Operation of Slaughter-houses, Quick Freeze Locker Plants, Meat Processing Plants in Alabama." Locker Operator 7, No. 3, 30, 32, 45-7 (1945). - Regulations governing oonstruction, equipment and operation of slaughter-houses, quick freeze locker plants, and meat processing plants in Alabama have been set up by the State Board of Health; and authority to enforce the regulations after January 1, 1946, has been granted by the Legislature.

R. A. 1, 101-02 (1946).

(2154) Anon., "Alfred University, N. Y., Outlines Two-year Course in Frozen Foods." Locker Operator 7, No. 4, 32 (1945). - A course in food technology and locker plant management is currently being offered by the New York State Agriculture and Technical Institute at Alfred University, N. Y. The course inoludes such subjects as raw materials, processing foods, and refrigeration theory and practice.

R. A. 1, 67 (1946).

(2155) Anon., "Freezing and Storing Herring." Modern Refrig. 48, No. 565, 83 (1945). - Scientific data on freezing and storage of herring as now applied to commercial practice, brought up-to-date; work carried out as part of program of Food Investigation Board of Department of Scientific and Industrial Research, and partly in conjunction with Herring Industry Board and Ministry of Food.

E. I. 1945, 920.

(2156) Anon., "Herring Quick-Freezing." Modern Refrig. 48, No. 568, 155-58 (1945). - Details of air blast freezing plant at Frazerburgh, operated by New Standard Cold Storage (Aberdeen) Limited, to order of Herring Industry Board; factory has oapacity of 9 tons of herring per day; refrigerating maohinery comprises two 12-inch and 8-inoh x 8-inoh twin oylinder compound monobloc compressors each running at 400 revolutions per minute off vee-belt drive from 70-horsepower Mather and Platt enclosed, ventilated, slip ring motor, turning at 1460 revolutions per minute; motor is fitted with air brake type control gear.

E. I. 1945, 920.

(2157) Anon., "Preservation of Fruit and Vegetable Products." N. Y. State Agr. Exp. Sta. 64th Annual Rep., 17-8 (1945). - Progress report on research projeot under way. The rate of change in flavor, color, and chemioal constituents of fruit juices is a function of the time and temperature of storage. The ooncentration of juices at the center of a can may be varied by

freezing at different rates, and almost any degree up to the theoretical may be obtained by freezing at a definite temperature. Thus, much of the juice may be concentrated at the center and, still being liquid, it may be drained off or centrifuged to recover a large proportion of the solids in a single operation. R. A. 2, 38 (1947).

(2158) Anon., "Correlation of Several Enzyme Tests on Blanched Fruits and Vegetables, with their Nutritive Value and Quality after Processing and Storage." N. Y. State Agr. Exp. Sta. 64th Annual Rep., 23 (1945). - Negative catalase or ascorbic acid oxidase tests were found to correlate best with the production of a most palatable and nutritious frozen product. The products included in the study were cabbage, carrots, asparagus, snap beans, corn, peas, soybeans, and apples. Work on this research project is being continued. R. A. 2, 37 (1947).

(2159) Anon., "Preservation of Fruits, Berries, and Vegetables by Means of Quick Freezing." N. Y. St. Agr. Exp. Sta. 64th Annual Rep., 23 (1945). - Report on research project under way. Peas and snap beans were frozen at 0, -10, -40, -60° F. and by immersion in liquid air. Photomicrographs of the frozen samples showed progressively larger ice crystals as the speed of freezing decreased, but photomicrographs of the corresponding thawed samples showed no differences. Vitamin determinations before and after cooking showed little differences for the various rates of freezing. It was concluded that the rate of freezing has little effect on resulting quality as far as these vegetables are concerned.

R. A. 2, 39 (1947).

(2160) Anon., "Nutritive Value and Quality of Fruits and Vegetables Prepared by Dehydration From the Frozen State." N. Y. State Agr. Exp. Sta. 64th Annual Rep., 24 (1945). - Report on research project under way. Preliminary samples of peas, string beans, whole kernel corn, spinach, potatoes, asparagus, and fruit juices dried by lyophilization were excellent in color, flavor, and ability to rehydrate. The ice vaporized from the vegetables held in a vacuum chamber was deposited in a moisture trap maintained at -100° F. An undesirable feature of the present process is the length of time required for dehydration.

R. A. 2, 37-8 (1947).

(2161) Anon., "Application of Electronics to Food Processing." N. Y. State Agr. Exp. Sta. 64th Annual Rep., 24-5 (1945). - Report on a research project under way. The loss of ascorbic acid by sliced cabbage during electronic blanching was negligible in comparison to the 30-40% losses occurring in steam or water processes.

R. A. 2, 37 (1947).

(2162) Anon., "Problems Faced By the New Frozen Foods Packer." Quick Frozen Foods 7, No. 9, 42-5 (1945).

(2163) Anon., "Commissary Develops Frozen Pies and Meats." Quick Frozen Foods 8, No. 2, 57 (1945).

(2164) Anon., "A Freezing Plant That Floats." Quick Frozen Foods 8, No. 4, 74-6 (1945). - A commercial-scale pilot plant for experimental and demon-

strational freezing techniques was built by TVA on three barges and floats on a lake at Spring City, Tennessee. Basic research on frozen foods is conducted in universities of seven Valley states, and promising processes, designs, and techniques are continued on a pilot plant scale in the TVA plant. The layout includes a tunnel air blast freezer, an immersion freezer, a processing room, a demonstration kitchen, and a machine shop.
R. A. 1, 97-8 (1946).

(2165) Anon., "More Frozen Foods; Snow Crop Marketers." Sales Management 55, 88 (November 15, 1945). - Group of noncompetitive producers organized to furnish a complete line of frozen fruits and vegetables under the Snow Crop Marketers, Inc., brand name. National distribution planned.
A. S. C.

(2166) Anon., "Frozen Foods Filing Cabinet Eliminates Need for Zero Room; Iceberg Refrigerated Locker Systems." Sales Management 55, 139-40 (December 15, 1945). - New frozen food storage unit with separate compartments similar to filing cabinets available in commercial and smaller sizes, eliminating need for cold storage "zero" rooms; should widen market for frozen foods.
A. S. C.

(2167) Anon., "Factors That Affect Quality in the Freezing Preservation of Peas." West. Frozen Foods 6, No. 5, 8-10 (1945). - Up to a certain point of maturity, freezing quality of peas increases with increase in firmness, size, and sugar content; beyond this point they become hard and starchy. Cleanliness, rapid handling, and low temperature (quick cooling both before and after blanching) make for sound sanitary practice and high palatability.
R. A. 1, 34 (1946).

(2168) Anon. Directory of Packers of Frozen Fruits, Berries, and Vegetables, 1944. National Association of Frozen Food Packers, Washington, 1945. 18 pages.

(2169) Anon. Directory of Public Refrigerated Warehouses. National Association of Refrigerated Warehouses, Washington, D. C., 1945. 105 pages.

(2170) Anon. The Use of Ascorbic Acid in the Food Industry in Frozen Fruits and Fruit Juices. N. Y.: Pfizer & Co., Inc., 1945. 12 pages.

(2171) Anon. 1945/46 Directory of Frozen Foods Processors of Fruits, Vegetables, Eggs, Sea Foods, Poultry, Meats, and Frozen Cooked Specialties. New York: Quick Frozen Foods, 1945. 309 pages.

(2172) Anon. Design of Freezer Locker Plants and Equipment. S. C. (Clemson) Agr. Col. Ext. Agr. Engin. Leaflet No. 66, 1945. 9 pages. - Specifications prepared by P. D. Rogers.

(2173) Anon., Agricultural Processing Industries. United States Bureau Reclam. Columbia Basin Joint Invest. Prob. No. 24, 1945. 120 pages. - Under direction of W. T. Calhoun.

(2174) Anon., Friction Stop for Tunnel Tray Tracks. United States Department of Agriculture, Bureau of Agriculture and Industrial Chemistry, Western Regional Research Laboratory Drawing No. A-118, Albany, California, n.d. - Detailed drawings.

(2175) Anon., Freezing Meat and Poultry Products for Home Use. United States D. A. AWI-75 Folder, Washington, 1945. - Brief directions are given for the preparation of all types of meats, poultry, fish, and eggs for freezing.

M. B.

(2176) Anon., How to Prepare Vegetables and Fruits for Freezing. United States D. A. AWI-100, 1945. - Direotions are given for the preparation, blanching, and paoking of various fruits and vegetables intended for freezing.

B. J. A.

(2177) Anon., Minnesota Frozen Food Locker Plants. United States D. I. Fish & Wildlife Serv. Mim. Rep. MDL-35, 1945. 10 pages. - The firm names and addresses of 464 looker plants in the state are given.

R. A. 1, 218 (1946).

(2178) Anon., Supplemental Research Report on Quartermaster Contraot Projects for the Period from July 1 through October 31, 1945. United States Off. of Tech. Serv. PB 581456, M. I. T. 11-12, Office of the Quartermaster General, Military Planning Div. Researoh & Development Br., 1945? - A study of frozen preoooked foods as used for Army combat rations is summarized. Also a method of Vitamin C determination is given in brief.

B. J. A.

(2179) Anon. Refrigeration. United States QMC. Tentative Text No. 19, n.d.

(2180) Anon., "Proposed Test Procedure Standards for Farm and Home Freezers, Storage Cabinets." Air Cond. & Refrig. N. 48, No. 16, 14-5 (1946). - Standards proposed by the Farm and Home Freezer Manufacturers Assooiation oover suggested uniform testing prooedures for determining the performance of farm and home freezers under laboratory test conditions. Typical items oovered include method for rating storage capacity, standard test conditions, pull-down test, no-load tests, and water freezing test. A sweating test to be performed under high ambient rh conditions and a power shut-off test to determine the warm-up oharaoteristics of a freezer in the event of power failure are included.

R. A. 2, 50 (1947).

(2181) Anon., "Dried-Frozen Egg Developments." Amer. Egg & Poultry Rev. 7, No. 12, 50 (1946).

(2182) Anon., "Microbiological Examination of Foods; Tentative Methods for the Microbiological Examination of Frozen Foods." Amer. J. Pub. Health 36, 332-35 (1946).

(2183) Anon., "Sky Plate Boost; Maxson Incorporates Food Division, Plans Stock Issue and big Expansion Program." Business Week, 32 (January 5, 1946).

- Description of expansion plans by the Food System Division of W. L. Maxon Corporation. National distribution of partly-cooked meals is expected soon.

A. S. C.

(2184) Anon., "Frozen Foods; A New Horizon." Business Week, 30-2 (February 2, 1946). - Three obstacles present problem to volume sales industry: transportation, warehousing, dispensing cabinets. 1% of fruits and 0.35% of vegetables eaten in U.S. are frozen foods. Fish, eviscerated poultry, and prepackaged meat will become important. Dr. Wm. Cathcart of A. & P. is experimenting with new electronic equipment to defrost frozen foods in a matter of seconds; this prevents the decomposition and discoloration often occurring at room temperature defrosting. Some work done using electronic treatment to inactivate enzymes and control oxidation is promising. Cost increases $\frac{1}{4}$¢ per month per lb. of frozen food stored, and storage space is scarce. Rail cars must maintain 10° F. or below, and to do this industry prefers the overhead bunker type with a ceiling of ice and salt over entire car. Reefer steamships holding an equivalent of 10 rail cars in freezing storage will make available two-way foreign trade. Precooked frozen foods, frozen bakery products, and Velva fruit have all been introduced, but lack of trained technologists are keeping these in their incipiency. Home and commercial food cabinets are becoming more available, and locker plants are expanding; these plus new advertising campaigns make the horizon for frozen foods look much brighter.

B. J. A.

(2185) Anon., "Freezer-heater; Quick-defrost, Refrigerating Machine." Business Week, 68 (April 6, 1946). - Gasoline-engine-driven refrigerating machine, developed for frozen foods in transit. maintains temperatures of -15° to -20° F. in trailers and refrigerator cars, and can defrost itself in ten minutes. It can also be used to warm winter shipments.

A. S. C.

(2186) Anon., "Frozen Food? You Just Open the Door." Business Week, 84 (April 6, 1946). - Description of newly developed frozen-food dispensing machine for retailers.

A. S. C.

(2187) Anon., "Refrigerator Truck Line; Texas Operators Request ICC to Authorize Trailer Truck Frozen Food Hauling in 41 States." Business Week, 64 (May 4, 1946). - Establishment of national frozen-food trucking firm sought to overcome difficulties in railroad refrigerator car shipments.

A. S. C.

(2188) Anon., "Meat Plan Test; Prepackaged and Frozen." Business Week, 69 (June 1, 1946). - Prepackaged and frozen steaks and other cuts will be offered by voluntary chain of markets of the American Steak Company of Kansas City.

A. S. C.

(2189) Anon., " Frozen in Cans." Business Week, 80 (October 19, 1946). - California food processor plans the packaging of frozen fruits and vegetables in tin cans. Firm's continuous-cooker method designed for mass production.

A. S. C.

(2190) Anon., "Food Frozen by Evaporation." Business Week, 64 (December 14, 1946). - Principle of new flash-freeze process is freezing by evaporation, using high vacuum created by steam ejection. Advantages include elimination of oxidation, moisture retention, and the freezing of food in individual pieces.

A. S. C.

(2191) Anon., "Proper Selection of Materials for Frozen Food Packaging." Canner 102, No. 16, 18, 20, 30 (1946); Fibre Containers 31, No. 9, 78-80 (1946). - The ideal frozen foods package must offer complete protection to the food; meet peculiar demands of frozen food packing, filling, storage; be of favorable cost; and offer good sales presentation opportunities.

M. B.

(2192)Anon., "Food Freezing." Fed. Sci. Prog. 1, No. 2, 18 (March, 1946). - Results of research by the Tennessee Valley Authority and cooperating agencies on the freezing of foodstuffs are briefly reviewed.

R. A. 2, 106 (1947).

(2193) Anon., "A Nation-Wide Survey of the Acceptance and Use of Frozen Foods by Hotels." Food Freezing 1, 388a-388h (August, 1946). - A comprehensive hotel survey was made so that the frozen food industry can more nearly meet the hotels' requirements of quality, economy, and convenience for its particular needs. Results showed a fair percentage of frozen vegetables, fruits, meats, fish, and poultry, but a very low percentage of frozen precooked foods and frozen baked goods being used by hotel chefs. Also the need for additional information about frozen foods was revealed, as well as a better quality product. Package sizes preferred were the 10-30 pound meat packs, and 2-5 pound vegetable packs.

A. S. C.

(2194) Anon., "Pacific Grape Pilots Immersion Freezing and All-tin Package." Food Freezing 2, No. 1, 16, 45 (1946). - The inauguration of the commercial freezing of fruit in vacuum-sealed tin cans by the Pacific Grape Procuts Co. may have far-reaching effects on the food-freezing industry. A production line is used with freezing in cans, instead of cooking, as the final processing step. On the freezer the cans are in continuous contact with an alcohol brine kept at a temperature of -35° F. The advantages of the can as a consumer container and the operational advantages in its use are pointed out.

A. S. C.

(2195) Anon., "Orange Juice ... 10,000 Gallons Daily for Door-to-door Delivery." Food Freezing 2, No. 1, 36-7, 49 (1946). - Discussion is given of the processing of oranges by the Cal-Grove Products Co. in the southern California orange belt. The oranges are washed and scrubbed, juiced (automatically sized and conveyed through juice extractors), de-oleomized to remove objectionable oils, homogenized by de-aeration under pressure, chilled, and sent to a rotator from which the juice flows slush-frozen into containers. Tests show that this juice, after thawing, contains as much vitamin C as that of juice from fresh-picked oranges.

A. S. C.

(2196) Anon., "British Columbia Canners Now Quick Freezing." Food in Canada 6, No. 10, 24-6 (1946).

(2197) Anon., "Frozen Foods Skyrocketed in Wartime Germany." Food Ind. 18, No. 2, 183 (1946). - Wartime shortages of tinplate forced Germans to go all out for frozen foods. In Germany and in countries controlled by Germany, hundreds of plants were built, and production was quadrupled in the first three years of war.

A. S. C.

(2198) Anon., "Freezing Point Data Sheets and Cooling Curves. I-V." Food Ind. 18, I, 513-17, April; II, 866-69, June; III, 1034-37, July; IV, 1370-71, September; V, 1716-17, November (1946). - The extent of under-cooking and the freezing points are shown graphically for canned apple sauce asparagus, green (string) beans, lima beans, pork and beans, strained beans, wax beans, beets, carrots, catsup, American cheese spread, Limburger cheese spread, old English cheese spread, olive pimento cheese spread, pimento cheese spread, pineapple cheese spread, relish cheese spread, chili sauce, cranberry sauce, creamed white corn, yellow corn, grapefruit juice, evaporated milk, mushrooms, pears, peaches in heavy sirup, peaches in light sirup, Alaska peas, sweet peas, pea soup, potted meat, pumpkin, salmon, sardines (pilchards), and spiced meat.

R. A. 2, 39 (1947).

(2199) Anon., "Frozen Orange Juice; Picture Story." Food Indust. 18, No. 5, 670-73 (1946). - Pictorial representation of methods and equipment used by California Consumers Corporation in quick freezing of orange juice; process takes about 40 minutes.

E. I. 1946, 963.

(2200) Anon., "Non-enzymatic Browning; Reaction in Foods; Symposium." Food Ind. 18, No. 10, 1523 (1946). - Interest in the browning reaction in foods was stimulated by army research. This is a digest of papers prepared for a symposium at a meeting of the American Chemical Society. Included were discussions of the control of browning, flavor improvement by browning, and the rate of browning in dehydrated vegetables, malt products, dried fruits, potato products, and dairy products.

A. S. C.

(2201) Anon., "Truck Frozen Shrimp over Desert Roads; 600-Mile Run from California to Arizona." Food Ind. 18, No. 10, 1551-52 (1946). - An insulated and refrigerated trailer with a capacity for transporting 20 tons of frozen shrimp for a distance of 600 miles is described. The refrigeration unit has a gasoline compressor.

R. A. 2, 46 (1947).

(2202) Anon., "Quick Freezing at Leith (Scotland)." Food Mfr. 21, No. 6, 233-38 (1946). - A quick freezing plant operated as a service to retailers, wholesalers or producers on commercial terms which will not enter into productive or retailing activities. Equipment and plant development are described, as well as plant management and the long-term policy of the operators.

R. A. 2, 42-3 (1947).

(2203) Anon., "Cost Studies in Frozen Food Processing." Food Pkr. 37, No., 41-2 (1946). - A breakdown of fixed, direct and indirect cost for processing

fruits and vegetables shows that costs of processing by freezing are no higher than for canning. Storage of frozen foods, however, is more expensive and justifies their higher selling price. The margin of profit in freezing vegetables is about 20%, while that for fruits is 11%. A 2000-lb.-per-hour freezing plant costs $60,000 to $90,000, about half of which is for preparation and freezing equipment, the remainder for building and other fixed costs. Studies made by the University of Arkansas, Bureau of Research.

R. A. 1, 160 (1946).

(2204) Anon., "Vacuum Pack Frozen Strawberries." Food Pkr. 37, No. 9, 37-8 (1946). - Vacuum packing of strawberries on a commercial scale is being tried in an effort to eliminate the hay-like flavor so prevalent in frozen berries and to reduce the rate of bacterial growth.

R. A. 1, 207 (1946).

(2205) Anon., "Developments in Canada's Frozen-fish Industry." For. Comm. W. 25, 24 (November 23, 1946). - The expansion of Nova Scotia's (Canada) frozen fish industry signifies a huge potential increase in the production of frozen fish. The interim report of the Fisheries Committee of Newfoundland's National Convention on the Cold-Storage Industry stresses the recent shift in the industry from frozen salmon, blueberries, and smelts, frozen bait, and more particularly, frozen fillets. The future of the industry depends upon the exploitation of the United States market.

A. S. C.

(2206) Anon., "Norway's Floating Deep-freeze Factory Soon Ready." For. Comm. W. 25, 24 (November 30, 1946). - Choice Norwegian cod fillets, quick frozen almost as soon as the fish are taken from the water, will be available for export this winter according to the Norwegian Information Service. The first of a number of ships which are floating deep-freeze plants will be completed in December and will serve as a temporary substitute for freezing plants destroyed by the Germans. It is equipped with the latest Birdseye freezing system, and typifies Norway's fisheries-modernization program to improve older methods involving salting and drying.

A. S. C.

(2207) Anon., "Bulgarian Activity in Quick-frozen Foods." For. Comm. W. 25, 43 (December 28, 1946). - During the war, a quick-frozen food industry was developed in Bulgaria with particular reference to fruits and vegetables. Production in 1945 amounted to 2,000 tons, with production in 1946 expected to be lower. The quick-freezing method introduced by the Germans is the American Birdseye system. With adequate shipping and storage facilities and more markets, the industry probably could expand further.

A. S. C.

(2208) Anon., "Frozen Foods--an Interim Report." Fortune 34, No. 2, 104-9, 178-82 (1946). - Of the $18 billion-odd spent in food stores in 1945, not more than $100 million, or less than 1%, went for frozen foods. Yet, there is a marked expansion of the number of stores designed to handle frozen products over the 400,000 that sold some 400,000 tons in 1945. The possibilities of the industry, presentation methods, and transportation and handling facilities are discussed.

R. A. 2, 42 (1947).

(2209) Anon., "Streamlined Fish Freezing." Frozen Food Ind. 2, No. 4, 12-3, 44-5 (1946). - A photographic tour of a modern fish-processing plant. Fish

are dressed, iced, and sorted as to variety aboard ship. First step at the plant is scaling; then the fish are filleted, and these are wrapped, weighed, and frozen.

B. J. A.

(2210) Anon., "Aging of Beef Before Freezing Causes Flavor Loss, Experimenters Claim." Frozen Food Ind. 2, No. 10, 38-9 (1946). - The flavor of aged beef deteriorates more rapidly while in frozen storage than that of unaged. Neither the method used in aging nor that used in freezing had any significance in development of off-flavors or toughness. Dehydration, drip, and cooking losses, as well as total food yield, were not affected by methods of aging or freezing, but by packaging used.

B. J. A.

(2211) Anon., "Dip-coating for Frozen Foods." Frozen Food Indus. 2, No. 11, 16-7, 42-3 (1946). - New thermoplastic wax coating flexible at low temperatures, provides form-fitting seal in quick single dip; conforms to irregularly shaped meat cuts, poultry, and fish.

B. J. A.

(2212) Anon., "Refrigerated Storage of Frozen Foods; What the Frozen Food Industry Needs, and How the Public Refrigerated Warehouses are Equipped to Supply these Needs." Ice and Refrig. 110, No. 1, 47-8 (1946).

(2213) Anon., "Frozen Food Conference in Stockholm." Konserves 4, 40-2 (April-May, 1946). - A summary of the frozen food situation in the Scandinavian countries. As a result of the conference, a committee was appointed to work out a proposal for cooperation between these countries on technical questions concerning freezing of foods.

R. A. 2, 42 (1947).

(2214) Anon., "Eighth Annual Locker Plant Count." Locker Operator 7, No. 7, 20-2 (1946). - A comprehensive inventory of the U. S. and Canadian locker plant industry.

R. A. 1, 98-9 (1946).

(2215) Anon., "Texas, Missouri Pass Locker Laws." Locker Operator 7, No. 10, 36, 61 (1946). - Legislation regulating many phases of locker plant operation which has been recently enacted by the states of Missouri and Texas is similar to that in other states. Both states require (1) that food shall be frozen in a room or compartment provided by the plant for that purpose before being placed in a locker, (2) that food shall be inspected by the the plant operator before being placed in a locker, (3) that all employees of a locker plant who handle food shall possess valid health certificates, (4) that the locker room shall be maintained at 0° F., with a tolerance of $\pm 5^{\circ}$ F., and (5) that locker rooms shall be equipped with accurate recording thermometers. The Missouri laws further require (1) that the recording thermometer charts shall be preserved for a period of 1 year and shall be available to agents of the Commissioner of Agriculture for inspection, (2) that every operator shall have a lien upon all property stored in the plant for charges due from owner of such property, and (3) that plant operators shall provide satisfactory content insurance to indemnify users against loss, cost of insurance to be paid by users. The Missouri act, which is reproduced quite fully in the article, contains other laws governing installation of refrigerating equipment and temperature in the chill and freezer rooms.

R. A. 1, 168-69 (1946).

(2216) Anon., "Locker Plant Law in Mississippi." Locker Operator 7, No. 12, 28 (1946). - The frozen food locker plant act of 1946 (Senate Bill No. 311) provides that all items placed in lockers are subject to inspection by State Board of Health. The operator is required to stamp the locker number and date of wrapping on each package. Minimum standards of construction and operation of locker plants are prescribed. Temperature requirements are: chill room 34° F.; sharp freeze room -10° F. for still air and 0° F. for forced air circulation; locker room 0° F. A recording thermometer is required for locker room, and direct reading thermometers shall be provided for the sharp freeze and chill rooms.

R. A. 1, 222-23 (1946).

(2217) Anon., "Ontario Locker Act." Lkr. Plants & Frosted Foods 1, No. 3, 29-33 (1946). - New regulations for locker plants in Ontario cover establishment, construction, equipment, and maintenance. A license and inspection of the plant are required. Entrance to locker room shall be by way of waiting room or vestibule. No person shall use tobacco in room where food is processed or stored. Recording thermometers are required for locker room; thermometers are required for all other refrigerated rooms. Plant personnel, sanitation, and wrapping stored foods are discussed.

R. A. 2, 50 (1947).

(2218) Anon., "Frozen Milk; It Keeps for Months in Paper Cartons." Mod. Packaging 19, No. 5, 128-30 (1946).

(2219) Anon., "Freezer Packages; A Survey of Commercial Types." Mod. Packaging 19, No. 5, 132 (1946).

(2220) Anon., "Locker Kits, Packages to Fit the Food." Mod. Packaging 19, No. 5, 158 (1946).

(2221) Anon., "Well-dressed Birds for a Broader Poultry Market." Mod. Packaging 19, No. 6, 122-24 (1946).

(2222) Anon., "Orange Juice Frozen in Cellophane Bags." Mod. Packaging 19, No. 6, 136-37 (1946).

(2223) Anon., "Foil for Freezers; A Single-unit Container." Mod. Packaging 19, No. 8, 101-03 (1946). - Experimental work by one of the leading frozen food packers in cooperation with Reynolds Metals Co. has led to the development of an aluminum foil package. Tests indicate that: (1) use of the aluminum foil container reduces freezing time 30% to 50% in comparison with conventional three-unit packages, and (2) the amount of time saved depends on the type of product and method of freezing. The container is made from a single sheet of aluminum foil by crimp-folding the sides and ends. This type container reduces freezer burn to a minimum because the water-vapor transmission rate of the foil is zero. Only one basic material is used; therefore, the foil container should reduce labor and machine operations. Its cost is said to be comparable to that of existing types of packages.

D. M. G.

(2224) Anon., "Waxed Fibre Can for Frozen Foods; Introduced by Seabrook Farms." Mod. Packaging 20, No. 3, 96-102 (1946). - By a highly mechanized

process, a metal-ends fiber container is produced by Seabrook, which possibly will reduce cost of package handling by elimating equipment, time, and labor formerly used to manually set up ordinary paper or fiber cartons. The new package gives preliminary indications of adequate water-vapor protection in both desiccator tests and freezer tests. Strength of container makes it attractive to distributors and retailers. Housewives will prefer the ease of opening this container to tedious unwrapping. Chief disadvantage is storage space required for empty set-up container. The can-making industry may enter frozen foods field with this part-metal container.

M. P.

(2225) Anon., "Frozen Cooked Meals; Maxson's Consumer Package." Mod. Packaging 20, No. 3, 130-31 (1946). - Meals consisting of a meat and two vegetables frozen in a molded fiber with special heat-resistant (up to 400° F.) thermoplastic coating may be cooked and served in the package, which is a compartmented plate, and the plate then thrown away. Housewives greeted the debut of this dinner package, which eliminates dishwashing, with acclaim. Retailers reported rapid sell-outs of stock. The package fits conveniently into frozen food cabinets.

M. P.

(2226) Anon., "Rigid Folded Vinyl and Acetate Boxes." Modern Plastics 23, No. 10, 112-13 (1946). - Description of method whereby no cementing is necessary on containers which are made up from flat die-cut plastic sheets folded so that material supports itself; boxes made up of cellulose acetate and vinyl sheeting may be made with solid corners, reinforced sides, and ends, in wide variety of sizes; plastic sheeting used ranges from 0.0075 to 0.40 gage.

E. I. 1946, 246.

(2227) Anon., "New Quick-freezing Plant." Modern Refrig. 49, No. 576, 55-6 (1946). - Illustrated description of plant erected for North British Cold Storage & Ice Company; equipment designed to quick freeze 15 tons of fish every 24 hours; air blast freezing employed.

E. I. 1946, 962

(2228) Anon., "Mobile Refrigeration System. The Transportable Cold Store." Mod. Refrig. 49, 11-2 (1946). - Illustrated description of a sectional (110 panels) 3-room cold storage plant with a total of 5,410 cu. ft. net space plus an air-lock chamber. It is designed to maintain 15° F. under tropical conditions and has a capacity of 50 tons of frozen meat or other produce. The panels are made of 8 in. of cork insulation and galvanized sheet steel on inner and outer surfaces. Tongue-and-groove joints with expanded rubber strips on both sides of the tongue form tight seals between edges of panels. Floor grids are of galvanized steel. Brine coils on ceilings are galvanized steel tubing with distributing manifold in air-lock chamber. Brine is supplied by mobile refrigerating unit through flexible rubber tubes and straight lengths of cork-insulated pipe with galvanized sheet steel covers. A similar plant was adapted to a barge for river transportation of frozen foods.

R. A. 1, 161 (1946)

(2229) Anon., "Beaverdell--A Modern Refrigerated Vessel." Mod. Refrig. 49, No. 4, 83-4 (1946). - The Beaverdell has 18 insulated compartments for carrying frozen meat; these together with insulated provision chambers have

a capacity of 163,318 cubic feet. The uninsulated cargo capacity of the ship is 434,394 cubic feet. Refrigerated spaces can be kept at any temperature between -10 and 10° F. with 70° F. cooling water, or at temperature between 10-15° F. with 85° F. cooling water. Two electrically-driven, horizontal, CO_2 compressors provide refrigeration.

R. A. 2, 46 (1947).

(2230) Anon., "The Heat Pump in the Food Industry." Mod. Refrig. 49, No. 4, 97-8 (1946). - A description, with flow diagram, of a 2-stage heat pump installation in combination with an industrial refrigeration system at Basle, Switzerland. The combined system, equivalent to a 3-stage pump, heats water from 10 to 70° C. (50 to 158° F.) with a coefficient of performance of 4.55. A total of 3.6 million calories per day is extracted for water heating from the following: (1) the superheat of compression of the refrigerating cycle in one gas cooler, (2) the superheat of the ammonia gas compressed by the first heat pump in another gas cooler, (3) part of the compression and friction heat of the two heat pump compression stages through the cooling jackets of the compressor, (4) part of the superheat of the gas compressed in the second heat pump stage in the oil separator, (5) the whole condensation heat of the ammonia gases compressed by the heat pump compressor in the condenser, and (6) part of the heat still contained in the liquid ammonia in the bottom element of the same condenser serving as a afterooooler.

R. A. 2, 48-9 (1947).

(2231) Anon., "Quick-frozen Whale Meat." Mod. Refrig. 49, No. 6, 133 (1946). - Whale meat compares favorably with prime beef in eating quality, and freezing is the best means of preserving it. A system is described by which the meat is cut into 50-lb. slabs, washed, and placed in molds which are greased with whale oil. The molds are immersed in circulating brine at -23° C. (-9.4° F.), and the meat is frozen. The meat is removed from the molds when its temperature is reduced to -4° C. (24.8° F.) and stored at low temperature. The processing is carried out aboard a 535-ft. ship.

R. A. 1, 209 (1946).

(2232) Anon., "A Floating Freezer." Mod. Refrig. 49, No. 10, 267-68 (1946). - The new whaling ship Balaena has a CO_2 refrigeration plant capable of freezing 100 tons of meat per day and holding about 600 tons in storage.

R. A. 2, 43 (1947).

(2233) Anon., "The Jackstone Froster." Mod. Refrig. 49, No. 10, 273 (1946). - A self-contained, transportable, multiplate freezer with a 7-1/2 horsepower water-cooled condensing unit is described. The freezer has a capacity of 360 pounds per loading.

R. A. 2, 43 (1947).

(2234) Anon., "Quick Frozen Food Caches." Mod. Refrig. 49, 340-41 (December, 1946). - Transportable quick frozen food depots were provided in large numbers in Switzerland during the war to ensure supplies for the population. The standard size unit had a capacity of 7000 cu. ft. and was held at 4° F. Refrigeration equipment was contained in a separate compartment and air was circulated within jacketed walls, not in the storage space. Ambient air defrosting permitted the maintenance of constant temperature within the chamber at all times. Quick freezing tunnels held at -40° F. by separate compressors were installed within the storage space at depots where foods were frozen.

R. A. 2, 201 (1947).

(2235) Anon., "Problems of Transporting Frozen Meats (in Trucks)." Nat. Provisioner 114, No. 2, 9, 21 (1946). - Various systems of truck refrigeration are briefly disoussed. Tabular data are presented on the amount of CO_2 ice required to protect 0° F. frozen commodities packed in 200-lb. test, single corrugated containers with double corrugated liners when the ambient air temperature is 75-100° F. R. A. 1, 101 (1946).

(2236) Anon., "Locker Full-fledged Meat Plant." Nat. Provisioner 114, No. 13, 19 (1946). - The trend toward complete meat packing and processing in locker plants is evident from the description given of a new $75,000 South Gate (California) plant.

R. A. 1, 160 (1946).

(2237) Anon., "Immersion Freezing of Foods Offers Possible Propane Market." Pet. Processing 1, No. 1, 8 (1946). - In the freezing preservation of foods, product quality depends largely upon the process used. For most products, the faster the freezing, the better the quality of the frozen food. From a scientific standpoint the best processes are those in which the products are immersed in the freezing media. O. P. B. reports reveal full-scale experiments on the use of liquid nitrous oxide, with excellent technical success. The latent heat of evaporation of the media was employed as well as the specific heat. At least two patents exist on the use of propane in a very similar manner. The many advantages of propane make it appear that further research is in order in this field.

A. S. C.

(2238) Anon., "Caution on Entering (Frozen Food) Industry Needed." Quick Frozen Foods 8, No. 7, 71-4 (1946).

(2239) Anon., "Shipping Frozen Foods in Less-than-Carload-Lots." Quick Frozen Foods 8, No. 8, 73-5 (1946). - Frozen food shippers or containers which are available for less-than-carload-lot shipments via railway cars or trucks include "Church Container" which has 10-12 cu. ft. of storage space and carries up to 100 lb. dry ice, or 90 lb. water ice, in metal bunkers; "Portacold" Fiberglas-insulated steel container which, with 200 lb. dry ice, offers 116 cu. ft., or with 500 lb. water ice, offers 101 cu. ft. net shipping space; "Shamrock Shipper" which is available in 50-lb. and 200 to 250-lb. sizes; "Arctic Hamper" of canvas duck insulated with cork which weighs 28 lb. empty and will carry 56 pint cartons; "Luscombe Container" made of aluminum and plastic which has 0.85-2.4 cu. ft. of space; "Coldtainer Shopper" which measures 6 x 14½ x 16 in. high inside and is primarily intended for retail deliveries; Fiberglas-insulated duck and "Vinyl Blankets" which are used as wrappers for packages refrigerated with dry ice. In England, where container service is well established, "brine-coil equipped containers" are used. R. A. 1, 164 (1946).

(2240) Anon., "Quick Frozen Foods Equipment Directory, 1946." Quick Frozen Foods 8, No. 8, 77-89 (1946). - A directory of manufacturers, wholesalers, and retailers of frozen food equipment is presented.

B. J. A.

(2241) Anon., "An Improved Method of Reheating Cooked Frozen Foods." Quick Frozen Foods 8, No. 9, 84-5, 128 (1946). - The Singer process of reheating

cooked frozen foods results in a more even distribution of heat, better protection of food, more speedy, and neater, all yielding a more tasty product. Packaging is of most importance and involves placing the food initially hot into double thicknesses of vegetable parchment formed into bags. This is securely sealed with a tightly-drawn cord and placed in freezer at -10° F. Reheating is accomplished by placing bag and all into boiling water and heating for 10-18 minutes. Maximum temperature reached inside the bag is 185° F., thus insuring proper heating of foods.

B. J. A.

(2242) Anon., "Foods Which Have Been Frozen." Quick Frozen Foods 8, No. 9, 102, 135 (April, 1946). - A list of over 400 foods which have been frozen either commercially or experimentally.

R. A. 1, 152 (1946).

(2243) Anon., "Protection is Still the Main Requisite in Packaging." Quick Frozen Foods 8, No. 10, 67-84 (1946). - Chiefly illustrations of new frozen food packages.

(2244) Anon., "Asparagus." Quick Frozen Foods 8, No. 11, 59-63, 110 (1946). - The preparation of soil, growing, harvesting, processing, blanching, and subsequent freezing of asparagus is generally discussed. Also, a list of asparagus packers is given.

B. J. A.

(2245) Anon., "Frozen Peas." Quick Frozen Foods 8, No. 12, 51-6 (1946). - Peas having been a consistently popular frozen food item, production has risen tremendously in the past few years. Over 39 million pounds of frozen peas were packed during 1945 in 12-ounce containers, and 40 million pounds more in other sizes. The definition of and ratings for peas to be frozen are given in some detail. The proper method of preparing the soil for sowing and the manner of beating the peas from the vines are discussed. One particular company's method of grading, freezing, and packaging is discussed in detail, the peas being solid and loose packed by either a continuous freezer or a multi-stage tubular freezer. A list of frozen pea packers is also included.

B. J. A.

(2246) Anon., "The Possibilities in Frozen Baked Goods." Quick Frozen Foods 8, No. 12, 60-2 (1946). - Frozen unbaked goods offer several advantages to bakers and consumers besides the excellent quality found in them. The chief such advantage is the elimination of stale goods and shortages, since products can be frozen when fruits are in season and production in finished form then closely keyed to demand. Also the work load on the bakers can be completely eliminated on holiday rush periods, weekends, etc. Top-grade ingredients and a rigid maintenance of zero temperatures in storage must be assured in order to compensate the consumer for the slightly higher prices involved. A list of processors of frozen baked goods is included.

B. J. A.

(2247) Anon., "Frozen Corn." Quick Frozen Foods 9, No. 1, 65-8, 110 (1946). - The history and future possibilities of the production of frozen corn, prices, soil preparation and choice of seeds, best planting methods, harvest-

ing, orop movements, processing, freezing, packaging, and distribution are discussed in a manner based on actual findings in the industry.

B. J. A.

(2248) Anon., "Transporting Frozen Foods by Truck." Quiok Frozen Foods 9, No. 1, 71-5 (1946). - A general disoussion of the manufacture of refrigerated truoks and lists of truok lines, dry ice companies, etc., are given.

B. J. A.

(2249) Anon., "Fish Freezing in Locker Plants." Quiok Frozen Foods 9, No. 1, 130-31 (1946). - Directions for preparing and freezing fish in locker plants are given. Fish may be frozen eithor whole, in steaks (from a large fish), or in fillets. All fish should be quick-frozen (less than 24 hours being required) and stored at 0° F. or below.

B. J. A.

(2250) Anon., "The Effect of Corn Syrup upon Freezing of Berries." Quick Frozen Foods 9, No. 1, 132-33 (1946). - Dew-blackberries and Young and Lucretia dewberries were treated with a patented corn syrup by (a) dipping and draining before packaging, and (b) packaging and oovering with syrup. Syrups of 75°, 59°, and 41.5° Brix were used. Packs were scored after one months storage at 0° F. (-18° C.) for color, collapse, and flavor. Color was well retained. No collapse oocurred in the Lucretia dewberry samples, but was marked in the other two berries where not frozen in syrup. Syrup-packed berries (b) generally were best in flavor.

B. A. 21, 198 (1947).

(2251) Anon., "Lima Beans." Quick Frozen Foods 9, No. 2, 59-64 (1946). - A general coverage of the entire frozen lima bean industry, from planting and harvesting, through freezing by various methods to the marketing of packaged products is given.

B. J. A.

(2252) Anon., "Processing Frozen Foods in the Texas Valley." Quick Frozen Foods 9, No. 2, I-III (1946). - Vegetables, fish, oysters, shrimp, Mexican pineapple, and ooconuts are being quick frozen in Texas. Experimental work on freezing bananas and papayas is also being done. The equable climate in Texas plus the proximity to rich growing lands and the Gulf waters make it even potentially greater as a quick-freezing center.

B. J. A.

(2253) Anon., "Spinaoh." Quick Frozen Foods 9, No. 3, 71-5, 120, 122, 182 (1946). - The entire frozen spinach industry is discussed, from planting and harvesting, through freezing by various methods to the ultimate marketing of the paokaged product. Also inoluded is a directory of spinach packers.

B. J. A.

(2254) Anon., "Brocooli." Quick Frozen Foods 9, No. 4, 61-5 (1946). - A discussion of all of the processes involved in freezing broccoli, from planting and harvesting to freezing, packaging, and marketing is contained herein. Inoluded also is a list of frozen brooooli packers.

B. J. A.

(2255) Anon. "Institutional Uses for Frozen Peaches and Apricots." Quick Frozen Foods 9, No. 4, 67-70 (1946). - A survey was made in New York City to determine pie preferences of men and women who chose among apricot, apple, peach, and blueberry varieties, with apple leading. Peaches and apricots are higher in vitamin content, with apricots leading in mineral value. Numerous methods of preparing these frozen fruits for desserts have been developed and offer many advantages to the bakers and institutional users as well as to individual consumers.

B. J. A.

(2256) Anon., "Shrimp." Quick Frozen Foods 9, No. 5, 59-62 (1946). - The production of frozen shrimp in Louisiana is followed from the time of the catch to the freezing of the product. A list of frozen shrimp packers and producers of prooessed and pre-cooked shrimp is inoluded.

B. J. A.

(2257) Anon., "Frozen Split Pea Soup Proves Suocessful Item." Quick Frozen Foods 9, No. 5, 80-1, 110 (1946). - The specialty of the house, split pea soup, has been successfully frozen using ohoice ingredients. Bacteriological checks are made on each batoh and the entire processing line is sanitary. Anderson's plans soon to market frozen old fashioned beef stew marinated in red wine, a lamb stew marinated in white wine, and a hot minoe pie.

B. J. A.

(2258) Anon., "Frozen Meat Home Delivery Inaugurated by Brooklyn Packer." Refrig. Eng. 52, No. 6, 544 (1946). - A.Gobel, Inc., is giving once a week home service to his customers of frozen foods. Fiber glass insulation is used, and an overall temperature of 28° F. is kept, with extra insulation in the freezing compartment. Purpose is to boost volume of wholesale store sales and for an advertising project.

B. J. A.

(2259) Anon., "The Frozen Fruit and Vegetable Industry in the United States." Rural Bank of N. S. Wales. Farm Front 4, No. 1, 12-4 (1946).

(2260) Anon., "Will Department Stores Dominate Frozen Food Selling, by Phone? Frostmaster Plan of Delivery from Low-rent Outlying Points." Sales Management 56, 58 (May 1, 1946). - Discussion of the plans of Frozen Food Products, Incorporated, to induce department stores into the frozen-foods marketing field. Plans for sales of "Frostmaster" frozen-foods cabinets, and delivery of frozen-foods from neighborhood distribution points are included.

A. S. C.

(2261) Anon., "New Freezing Tunnel Speeds Frozen Food Output: Consumers Packing Co. of Lancaster, Pa." Sheet Metal Worker 37, No. 11, 58 (1946). - Continuous packing of frozen foods is made possible by a 62-foot long freezing tunnel with a capacity of 2 tons per hour and oapable of maintaining temperature at -30° to -40° F., recently completed by the Consumers Packing Company of Lanoaster, Pennsylvania. The advantages of freezing in a oontinuous operation (by means of the tunnel) over the conventional method of using separate freezing chambers are pointed out.

A. S. C.

(2262) Anon., "Frozen Foods: Today and Tomorrow, I-V. An Analysis of Frozen Food Production and Distribution and the Possibilities for Developing a Mass Retail Market for Frozen Foods." Super Market Merchandising 11, No. 3, 68-76, 81-5; No. 4, 63-81; No. 5, 63-95; No. 6, 61-82; No. 7, 53-73 (1946).

(2263) Anon., "Good Protection in Freezer Important." USDA Bur. Animal Ind. Ann. Rep. for 1945-46, 5 (1946). - Samples vacuum-packed in tin-plate cans and unprotected samples of fresh beef and pork were stored at 0° F. for 54 and 82 weeks. When thawed at 45° F. the vacuum-packed samples showed less loss in weight and greater flavor retention than the unprotected samples.
R. A. 2, 194 (1947).

(2264) Anon., "Studies on Freezer-storage Temperatures." USDA Bur. Animal Ind. Ann. Rep. for 1945-46, 5-6 (1946). - Beef samples, cellophane wrapped, were stored at 0 and 16° F., and at 0 and 16° F. alternated on a 7-day cycle. The results indicate that temperatures which fluctuate between satisfactory and unsatisfactory for meat storage may be as detrimental to the product as a constant temperature at the higher level.
R. A. 2, 192 (1947).

(2265) Anon., "Effect of Aging and Subsequent Freezing on Beef Tenderness." USDA Bur. Animal Ind. Ann. Rep. for 1945-6, 6 (1946). - After 48 hours of aging at 35° F., beef short loin steaks 1.5 in. thick were approximately 24% less tender than similar samples which were tested 24 hours subsequent to slaughter of the animal. Additional storage periods of 24 and 48 hours, making totals of 72 and 96 hours, produced meat that was as tender as that tested at the end of the first 24 hour period. Aging for 120, 240, and 360 hours resulted in increased tenderness at each stage. Freezing at 0° F. after aging had little effect on tenderness after only 24 hours, whereas after 48 hours it had a marked effect.
R. A. 2, 184 (1947).

(2266) Anon., "Rehydration to Counteract Freezer Burn." USDA Bur. Animal Ind. Ann. Rep. for 1945-6, 6 (1946). - Desiccated beef steaks were rehydrated by thawing at 36° F. in water for 3.5 hours. The rehydrated meat after broiling was juicy and tender but had lost flavor.
R. A. 2, 184 (1947).

(2267) Anon., "Equipment and Methods for Home Freezing of Foods." USDA Bur. Human Nutrition & Home Econ. Ann. Rep., 6-9 (1946). - The temperature inside a freezer cabinet rises rather rapidly when its condensing unit is not operating due to power outage or mechanical failure. External insulation (blankets) alone is ineffective in retarding the temperature rise. In a chest-type cabinet with 25% load, 40 pounds of carbon dioxide ice prolonged the period before 15° F. was reached by about 36 hours, the total time being about 48 hours. Doubling the amount of carbon dioxide ice prolonged the time by about 50%. Marked changes in quality occur in frozen food when subjected to temperature changes varying from 0 to 20° F.
R. A. 2, 193 (1947).

(2268) Anon., "Canning and Quick Freezing of Vegetable Soybeans." USDA Bur. Plant. Ind. Ann. Rep. for 1945-6, 37-8 (1946). - Quick frozen soybeans resemble the fresh food better than the canned product. The frozen product

has been judged excellent; the flavor and texture are good and the color is attractive. R. A. 2, 178 (1946).

(2269) Anon. Preserve by Freezing. Freezing of Fruit, Vegetables, Meat, and Dairy Products. Edmonton, Alberta, (Can.) Dept. Agr., Agr. Ext. Serv. Bulletin No. 72, 1946. 15 pages.

(2270) Anon. Unbaked Frozen Products. I-III. Chicago, Assoc. Retail Bakers of America. Research & Merchandising Dept. Bulletin Nos. 131, 138, and 139, 1946.

(2271) Anon. Foreign Commerce of Brazil; Exportation of Frozen Meat, 1942/44. Servico de estatistica economia e financeira, Rio de Janeiro, Brazil, 1946. 5 pages.

(2272) Anon. Foreign Commerce of Brazil; Exportation of Frozen Meat, 1943/45. Servico de estatistica economia e financeira, Rio de Janeiro, Brazil, 1946. 5 pages.

(2273) Anon. Frozen Fruit and Vegetable Pack in California, 1939-1945. California State Chamber of Commerce. Research Dept. Economic Survey series, 1946-47. Report Nos. 8-19, 1946. 1 page each.

(2274) Anon. Freezing Fruits and Vegetables. Canada Dept. Agr. Household Bulletin No. 21, Revised Pub. No. 773, 1946. 11 pages.

(2275) Anon. Outline of Lecture Before Locker Plant Short Course. Kansas State College, Manhattan, Kansas, 1946. 27 pages.

(2276) Anon. Minnesota Creameries, Cheese and Ice Cream Factories, Milk Plants, Canneries, Bottlers, and Refrigerated Food Lockers, 1946. Minnesota Dept. of Agriculture, Dairy and Food, Bureau of Information, 1946. 80 pages. - Data on the butter, cheese, and ice cream industries.

(2277) Anon. Frozen Foods Locker Plants Directory, U. S. A., Listings by States, 1946. Des Moines, Ia.: National Frozen Food Locker Assn., 1946. 75 pages.

(2278) Anon. Article 19 of the Agriculture and Markets Law (Chap. 48, Laws of 1922, as amended) Relating to Refrigerated Warehouses and Locker Plants, With Rules and Regulations, 1946. N. Y. Dept. Agr. and Markets Circ. No. 666, 1946. 10 pages.

(2279) Anon. Standard Practice Manual for Frozen Food Locker Plants. N. Y. State Frozen Food Locker Assoc., 1946. 29 pages.

(2280) Anon., Information Regarding Frozen Fish Holdings at Glouoester, Mass. United States Congress, House Committee on Merchant Marine and Fisheries, Washington, D. C., 1946. 3 pages.

(2281) Anon., Information Sheet on a Test for Adequacy of Blanching in Frozen Vegetables. USDA Bur. Agric. & Ind. Chem. AIC-34, Washington, D. C., 1946. 2 pages. - The test for adequacy of blanching in frozen vegetables is based upon the determination of peroxidase activity. Reagents used are 0.5% guaiacol in 50% ethyl alcohol solution, 0.08% hydrogen peroxide, and clean sand.
R. A. 2, 175 (1947).

(2282) Anon., Selected Bibliography on Freezing Preservation of Fruits and Vegetables. United States Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, Western Regional Research Laboratory, Mimeographed Bulletin AIC-40, Rev. No. 2, Albany, California, 1946. 21 pages. - A chronological bibliography, all of whose references appear in Georgia School of Technology, State Engineering Experiment Station Special Report No. 23.
B. H. W.

(2283) Anon., Explanation of Operation of Draper-Type Atmospheric Steam Blancher. United States Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, Western Regional Research Laboratory, Unnumbered Mimeographed Bulletin and Drawing No. D-214, Albany, California, 1946. - Suggested construction specifications for insulated, atmospheric draper-type, steam blancher of variable capacity are given. A chart gives the number of intermediate units required for a blancher of specified capacity, width, loading density, and blanching time. Detail drawings of intermediate units, loading units, unloading unit, and piping diagrams are included.
M. P.

(2284) Anon., Home Freezing of Fruits and Vegetables. United States Department of Agrioulture, Bulletin AIS-48, Washington, 1946. 24 pages. - A general booklet containing illustrations and direotions for preparing and freezing corn, peas, broccoli, peaches, strawberries, etc. Equipment for filling and sealing packages is described. Very general.
B. J. A.

(2285) Anon., Frozen Food Locker Plants in the United States, Ninth Annual Count, July 1946. United States Department of Agriculture. Extension Service, 1946. 1 page.

(2286) Anon., Freezing Fruits and Vegetables. United States Department of Agriculture Program Aid, 1946. 6 pages.

(2287) Anon., Tentative United States Standards For Grades of Frozen Sweet Cherries. United States Department of Agriculture, Production & Marketing Administration, 1946. 8 pages.

(2288) Anon., Tennessee Frozen Food Locker Plants. U. S. D. I. Fish & Wildlife Serv. Mim. Rep. MDL-3 (Rev.), 1946. 2 pages. - The firm names and addresses of 56 locker plants in the state are listed.
R. A. 1, 218 (1946).

(2289) Anon., Georgia Frozen Food Locker Plants. U. S. D. I. Fish & Wildlife Serv. Mim. Rep. MDL-5 (Rev.), 1946. 2 pages. - The firm names and addresses of 47 locker plants in the state are listed.
R. A. 1, 218 (1946).

(2290) Anon., North Dakota Cold Storage Locker Plants. U. S. D. I. Fish & Wildlife Serv. Mim. Rep. MDL-16 (Rev.), 1946. 4 pages. - The firm names and addresses of 166 locker plants in the state are listed.

R. A. 1, 218 (1946).

(2291) Anon., Louisiana Frozen Food Locker Plants. U. S. D. I. Fish & Wildlife Serv. Mim. Rep. MDL-27 (Rev.), 1946. 1 page. - The firm names and addresses of 22 locker plants in the state are listed.

R. A. 1, 218 (1946).

(2292) Anon., Vermont Frozen Food Locker Plants. U. S. D. I. Fish & Wildlife Serv. Mim. Rep. MDL-28 (Rev.), 1946. 2 pages. - The firm names and addresses of 37 locker plants in the state are listed.

R. A. 1, 218 (1946).

(2293) Anon., Cooperative Frozen-Food Locker Plants. United States Farm Credit Admin., Circ. C-127, 1946. - Planning for cooperative ownership and operation, locating the locker plant, financing the project, plant design, handling and storage of meats, keeping the books, and selecting plant personnel are points included.

B. J. A.

(2294) Anon. Planning a Locker Plant for the Southeast. University of Tennessee Agric. Ext. Serv. Publ. No. 294; Georgia Agr. Coll. Ext. Bull. No. 528, 1946; Tenn. Agr. Coll. Ext. Pub. No. 299, 1946; Va. Agr. Coll. Ext. Bull. No. 168, 1946. 36 pages. - Engineering information is presented for those who plan to build and/or operate a locker plant. Data on the economy of locker plants are also given.

R. A. 1, 192 (1946).

(2295) Anon. A Reference Manual On Modern Electric Household Refrigeration and Home Freezing. Westinghouse Elect. Corp. Home Econ. Institute Reference Handbook No. 3, Revised, Mansfield (Ohio), 1946. 29 pages.

(2296) Anon., "Frozen Food Enters Selling Era." Business Week, 28 (January 4, 1947). - New and potential frozen food markets will be determined by storage space, quality production, elimination of brokerage, and lower wholesale markups (which will both lower the cost to consumers and direct sales by chain outfits).

B. J. A.

(2297) Anon., "Frozen Food Squeeze." Business Week, 68 (February 22, 1947). - Sizable amounts of frozen fruits and vegetables--some estimates run as high as 100,000,000 pounds--that are inedible in storage must be sold at price cut, or dumped, while an unestimated quantity, packed for home consumption, is so inferior that it probably will have to be repackaged and sold at a loss to commercial users. The question of which group--the banks, packers, distributors, or refrigerated warehouses--will bear the loss has arisen. The need for frozen food standards has not yet been met by the National Association of Frozen Food Packers.

A. S. C.

(2298) Anon., "Thought for Food; Frozen Food Industry Plans Standards of Quality and Labeling." Business Week, 21 (March 29, 1947). - In order to battle for a bigger share of the consumer market, the National Association of Frozen Food Packers has agreed on quality standards for all products, an educational and publicity program, and changes in descriptive labeling.
A. S. C.

(2299)Anon., "Frozen Meat Future Dim." Business Week, 62 (March 29, 1947). - Only when packers find that freezing will do the job more cheaply and more efficiently than fresh meat can be shipped will they convert to large-scale quick freezing and packaging. This will take from 10-20 years. Retooling of packing industry's operations; increased storage capacities at slaughterhouses; new refrigerator cars, trucks, and branch houses must be converted to 0° F.; all these are among the obstacles. Labor difficulties will also arise. Top-quality beef will dominate frozen sales, whereas only 10% of total beeves butchered yield top-quality meat; thus cheaper cuts, veal, and lamb will suffer a loss in sales. In addition, consumers must become accustomed to demand quick-frozen meat, processed by either the retail dealer or the packers themselves.
B. J. A.

(2300) Anon., "Iceland's Frozen Fish Picture." Can. Refrig. J. 13, No. 1, 21-2 (1947).

(2301) Anon., "Frozen Foods; Wisbech Produce Canners." Elec. R. (Lond.) 140, No. 3607, 51-3 (January 10, 1947). - Blast-tunnel quick-freezing of fruits and vegetables has again been resumed in England. Plums, tomatoes, cucumbers, peas, beans, asparagus, and spinach have been frozen. At Wisbech, blanching, handpicking, and freezing are accomplished by older means, cartons being fed on to constantly moving conveyors. At Faversham, foods are frozen first, using 6 trolleys (containing trays) per tunnel. Temperature in tunnel is -45° F., and NH_3 compressor is provided with a gas and liquid precooler as well as a 50 HP, 1000 r. p. m. booster compressor. Air circulates in the tunnel at 20,000 cu. ft. per minute. Food is broken up after freezing by a special machine. Store-room temperature in 0° F., with outside indicators and warning lights.
B. J. A.

(2302) Anon., "Seabrook Farms--an Example of Applied Quality Control." Food Freezing 2, No. 4, 183-6, 222 (1947). - Four related companies are links in

(2303) Anon., "Ontario Freezing Plant Uses Jacket Refrigeration." Food Freezing 2, 429-30, 449 (1947).

(2304) Anon., "Immersion Freezing of Fruits and Vegetables in Cans Now in Full Operation." Food Freezing 2, No. 8, 543-45 (1947). - A new frozen food the quality control program of one frozen-food processor and provide a continuity for maintaining high standards from growing of the vegetables through delivery of the frozen product to the distributors. Proximity of field operations plays a major role in obtaining vegetables which have a high vitamin content, proper sugar balance, good color, flavor, and texture. A radio communication system is used between field and headquarters. The complete quality control system is discussed, one of the most important factors of which is quality grading in the packing department. Warehousing of the product, or frozen storage, takes place at -10° F. with no loss of time.
A. S. C.

plant designed especially for vacuum packing and oontinuous freezing of fruit and vegetables in tin cans has been put into operation by Pacific Grape Products Co. Packages are attractive as well as being moisture vapor-proof. Great speed in both processing and freezing are possible as regular oanning equipment can be used for the former and the immersion freezing method is used, being noted for its speed. In the oase of vegetables, holes are punched in the can and then sealed with wax to render any heat treatment impossible before final cooking. Aloohol was the immersion medium.

A. S. C.

(2305) Anon., "Fish Fillet of Uniform Size and Weight now Reality." Food Freezing 2, No. 8, 568 (1947). - A standardized fish fillet well adapted to modern packaging and progressive merchandising has been introduoed by Atlantio Coast Fisheries. The fillets pass on a belt through a series of rollers which press the fish into a long strip 4 in. wide and 3/4 in. high and out into 8 in. lenths. The resulting product is of completely uniform consistency. After packaging, virturally all of the fillets are frozen by the plate method. A. S. C.

(2306) Anon., "Undercooling Retards Freezing of Canned Foods." Food Ind. 18, No. 4, 513-17; No. 6, 866-69; No. 7, 1034-37; No. 9, 1370-71; No. 11, 1716-17 (1946); 19, No. 2, 188-90 (1947). - Tables.

(2307) Anon., "Frozen Food Distributional Facilities of the United States." Food Ind. 19, No. 1, 27-8 (1947). - A map and data on frozen food distributional faoilities in the United States, suoh as looation and number of refrigerated warehouses and looker plants.

A. S. C.

(2308) Anon., "Frozen Food Marketing Areas of the United States." Food Ind. 19, No. 2, 161-62 (1947). - Map and data showing location and giving size of frozen food marketing areas in the United States of 50,000 or more in population. A. S. C.

(2309) Anon., "Freezing Point Data Sheets and Cooling Curves. VI." Food Ind. 19, No. 2, 188-90 (1947). - The extent of undercooling and the freezing points are tabulated and also shown graphically for canned spinach, succotash, sweet potatoes, tomatoes, tomato juice, tomato soup, tuna fish, and vinegar.

R. A. 2, 107 (1947).

(2310) Anon., "Wax Coating Frozen Foods." Food Ind. 19, 453, 580 (1947); Lkr. Plants & Frosted Foods 2, No. 2, 12-3 (1947). - Foods are prepared, frozen, and dip coated in melted thermoplastic wax at 130-212° F. The wax immediately hardens, forming a tough, close-fitting, flexible wrapper suitable for fish, meats, poultry, fruits, and vegetables. Meats wrapped in this manner have been held for 1 year without evidence of freezer burn. The coating does not stiok to the food but strips easily. A batch-type dipping tank that will coat 500-1000 pounds per hour has been designed for locker plants and other small operations.

R. A. 2, 194-95 (1947).

(2311) Anon., "Freezer Trucks Hold Foods at Zero; Pacifio Intermountain Express." Food Ind. 19, No. 5, 628-29 (1947). - Controlled temperature ser-

vice is offered by Pacific Intermountain Express between the West Coast and the Middle West in straight truckload quantities. Any precooled cargo load can be maintained at controlled temperatures of plus or minus 2 degrees within a range of from 0° to 70° F. The refrigerating equipment is self-contained on the trailer, and the load is maintained at its preoooled temperature by surrounding it with a blanket of circulating cold air.

A. S. C.

(2312) Anon., "Changes in Fats and Oils During Freezing and Thawing." Food Ind. 19, No. 5, 632-33 (1947). - Data are summarized in tables and graphs on the changes occurring in fats and oils during freezing and thawing. Lard, shortening, and oleomargarine solidified and did not freeze at -1 to -5° F. Salad oil clouded, while mayonnaise and salad dressing thickened, jelled, and in some cases the emulsions separated in the cold state. These conditions disappeared when normal temperatures were again reached, the speed depending upon the size of the container.

B. J. A.

(2313) Anon., "Frozen Food Packers Study Factors in Tighter Markets." Food Ind. 19, No. 5, 645 (1947). - At the National Frozen Food Industry Convention held in San Francisco were exhibits showing promise of relieving retail bottlenecks, while the discussions stressed the industry's danger zones, in competition for the market.

A. S. C.

(2314) Anon., "Transportation of Frozen Foods." Food Pkr. 28, No. 3, 164-65 (1947. - Carbon dioxide ice is used in a fleet of 200 refrigerated trucks to maintain temperatures as low as -10° F. A charge of ice consists of 8 cakes weighing about 59 pounds each. Proven features for new refrigerator cars include half-stage icing devices, herring-bone floor racks, and convertible ice bunkers.

R. A. 2, 201 (1947).

(2315) Anon., "Buyer's Directory for Special Equipment for Frozen Food Packers." Food Packer 28, No. 3, 167-76 (1947).

(2316) Anon., "Evisoerated Poultry." Frozen Food Ind. 3, No. 3, 22-3, 45 (1947). - A review of the literature on quick frozen, eviscerated poultry, plus a table of comparative data on length and type of storage versus the palatability of the product.

B. J. A.

(2317) Anon., "South's Bid for Frozen Strawberries." Frozen Food Ind. 3, No. 4, 8-9, 39-40 (1947). - This is a general discussion of the strawberry freezing plant at Portland, Tennessee, which has a daily capacity of 300,000 pounds, or between 2-3 million pounds of berries for the season.

B. J. A.

(2318) Anon., "Freezing Precooked Meals is Big Business with Frigidinner." Frozen Food Ind. 3, No. 5, 6-7, 34-5 (1947). - The Frigidinner plant in Philadelphia quick-freezes such preoooked specialty dishes as shrimp a la Normandie, crab d'Ostende, baked chicken a la king, chicken hunter's style, filet mignon Chateaubriand, etc.. in one- and two- portion packages. In

addition to the regular personnel of butchers, chefs, packagers, and supervisors, special demonstrators are employed to introduce the foods to the public

M. B.

(2319) Anon., "Cross-country Cooling." Frozen Food Ind. 3, No. 5, 15 (1947); Refrig. Ind. 4, No. 5, 45, 64 (1947); Ice & Refrig. 112, No. 5, 21-2 (1947). - Mechanically refrigerated trucks which automatically provide any desired temperature from 0 to 70° F. in the cargo space are now in service.

R. A. 2, 201 (1947).

(2320) Anon., "Poultry Packers Must Keep Consumer Prices in Line." Frozen Food Ind. 3, No. 5, 26-7 (1947). - Thus far, prices for frozen eviscerated poultry have been unreasonably higher than those for uneviscerated poultry. Actual production costs can permit a decrease in the retail price. Further research on packaging and transportation methods must be completed before the distribution of frozen heat can be expanded.

M. B.

(2321) Anon., "The Future Market for Home and Farm Freezers." Frozen Food Ind. 3, No. 6, 10-1, 46 (1947). - The survey made by the market research division of Owens-Illinois Fiberglass Corporation indicates that 75% of the electrified farms in the United States, or 50% of all farms, will have either a home freezer or locker within about 10 years. The most practical and popular freezer size for the typical rural family has about 25 cu. ft. of food storage capacity. Such a unit should not exceed about $450 in order to reach the majority of rural families. Optimum insulation thickness is 6 inches. Community locker plants will still be in demand. The largest demand for freezers and lockers is in the high income corn belt and the dairy states, the South, Western ranch states, and Western areas of the country.

M. B.

(2322) Anon., "Progress in Mechanical Refrigeration on Wheels." Frozen Food Ind. 3, No. 6, 24 (1947). - Demand is increasing for refrigerated trucks which can maintain constant cold temperatures on long road trips or in case of delayed access to permanent storage space. The gasoline-powered freezing units are independent of the tractor or truck engine and can, therefore, continue in operation in case of truck breakdown.

M. B.

(2323) Anon., "Frozen Pastries and Precooked Meals Provide Volume Production." Frozen Food Ind. 3, No. 6, 26-7, 34-5 (1947. - Frost-Cooked Foods, Inc., of Boston, specializes in the quick-freezing of ready-to-serve complete meals, including meats, vegetables, and fancy desserts. The prepared foods are frozen on coiled refrigerator shelves with the aid of a wind blast produced by large fans, the time required for freezing depending on the thickness of the product. The new retail price range of these foods is intended to place this type of frozen product within the reach of average customers.

M. B.

(2324) Anon., "Iceless Reefer Tested by USDA." Frozen Food Ind. 3, No. 7, 17, 34 (1947). - U. S. Department of Agriculture tests indicate that an iceless refrigerator car can maintain, under summer heat conditions, approxi-

mately 0° F. temperatures, impossible in the ordinary refrigerator car. Liquid anhydrous ammonia is the refrigerant used. The car itself has a total loading capacity of 1,938 cubic feet, and its insulation specifications call for the use of Naturegone, Silvercote, Celotex, and Hairocraft. In the 10-day test run the average top commodity temperatures ranged from -4° F. to 1° F., while bottom commodity temperatures ranged from -3° F. to 3° F. M. B.

(2325) Anon., "Refrigerator Car Tests for Frozen Foods Show Results of Dry Ice and Different Insulation." Ice & Refrig. 112, No. 5, 19-20 (1947). - Further preliminary results are reported on AAR and USDA refrigerator car shipping tests. A transcontinental test shipment of frozen foods to determine the effect of (1) adding carbon dioxide ice to a conventionally refrigerated car and (2) covering the top and bottom of a loaded car with kraft paper to cause air to circulate around rather than through the cargo. Adding 2000 pounds of carbon dioxide ice did not lower the overall car temperature appreciably because the downward movement of cold air and gas from the carbon dioxide ice in the top layer interfered with the natural air movement in an end bunker car. Another test shipment was designed to determine the protection offered by different thicknesses of insulation in the car walls, floor, and ceiling. The results of this test were inconclusive because of relatively low outside temperatures encountered.
R. A. 2, 201 (1947).

(2326) Anon., "Automatic Cellophane Bagging of Frozen Foods; Making, Filling, and Heat Sealing Bags." Mod. Packaging 20, No. 7, 143-45 (1947).

(2327) Anon., "Frozen-Food Packs Shifting." Mod. Packaging 20, No. 8, 198 (1947. - Preliminary figures released by National Association of Frozen Food Packers showed that in 1946 there was an evident shift to retail sized packs and a decline in large and small institutional packs in the packaging of eight major frozen fruit and vegetable items. The packers' figures also showed that the total packs of frozen corn, peas, asparagus, spinach, red sour pitted cherries, and strawberries increased in volume in 1946, while apricots and peaches showed a decline.
D. M. G.

(2328) Anon., "First National Frozen Foods Exposition and Convention, San Francisco, March 19-21, 1947." Mod. Packaging 20, No. 8, 206 (1947). - M. T. Rogers, Packaging Institute president, urged the frozen foods industry to spend considerable research on its packaging problems. He said that a recent survey showed that over half the industry was still using the same basic package introduced 15 years ago; namely, a combination of bag or liner, waxed carton, and overwrap. More than 100 firms displayed their products to the 7,000 dealers, packers, and distributors who attended the first national Frozen Foods Exposition and Convention at San Francisco.
D. M. G.

(2329) Anon., "Drawn Acrylic Lid on Deep Freeze Unit." Mod. Plastics 24, No. 3, 94-6 (1947). - The operational and production conditions that had to be met by methyl methacrylate before it was suitable for deep freezer lids were: non-fogging properties, dimensional stability, resistance to abuse, easy maintenance, a low price, easy packing, and standardization in size. In addition, the transparency of the lids with the rich blue color of the handles gives sales-promoting eye appeal. A. S. C.

(2330) Anon., " Pre-oooked Frozen Meals in Vending Maohines." Ptr. Ink. 218, 71 (January 31, 1947). - A variety of electronically pre-cooked frozen food dinners oonsisting of a selection of one meat course, one vegetable, and one style of potato serving will be offered to the public in a meohanioal dispenser. The oontainers, of aluminum with sprayed enamel surfaoe, act as a dish, and may be thrown away after use (since their oost is about one cent a plate to the manufacturer), eliminating dishwashing.
M. P.

(2331) Anon., "Fillets." Quiok Frozen Foods 9, No. 6, 59-61, 120 (1947). - The production of frozen fish fillets is followed from the time of the catch to the freezing of the produot. The many advantages offered by frozen fish fillets such as ease of preparation, assured freshness, and laok of bones make future market prospects for them seem bright. The laok of grading standards puts this responsibility on the individual produoer. The prooesses of brining and filleting by maohine are desoribed and a table for oriteria of quality in fish is given.
A. S. C.

(2332) Anon., "Streamlining Speeds Apple Freezing." Quick Frozen Foods 9, No. 6, 96 (1947). - Automatic peelers, peeling and ooring 56 apples per minute, pass apples along a belt to a chopper which slices them. Blanohing is now done at 200° F. for 3½ minutes. When apple sauce is being frozen instead of the sliced apples, they are oarried on to a pulper (oapacity 5-7 tons per hour) and a strainer. Syrup is added to barrels of pulp, mixed, and then oartons are filled. Apple sauce is frozen in brine diffuser freezing tunnels for 6 hours at -20° F., and then stored at 0° F.
B. J. A.

(2333) Anon., "Poultry." Quick Frozen Foods 9, No. 7, 57-60, 85 (1947). - From first freezing poultry during Civil War, this product has become one of the chief frozen items. By June, 1944, the pack amounted to 84,000,000 pounds. Chickens, duoks, turkeys, geese, squabs, and pigeons are all olassed as poultry, and the breeding areas are widespread. USDA standards are rigidly adhered to in the grading and inspection of birds as well as in their raising and slaughtering. They are killed with a knife following an electrio shock which stuns them. Pioking is mechanized now, a machine with many rubber fingers with suction caps being used. Automatic scalders and roughers are used to dress poultry, after which they are cooled immediately. Then they are drawn or eviscerated, and sent to the freezing rooms, either whole or cut up. Careful wrapping is essential as poultry is extremely sensitive to freezer burn during storage.
B. J. A.

(2334) Anon., "The Refrigeration Research Foundation's Service to the Industry." Quick Frozen Foods 9, No. 7, 62-3 (1947). - The Research Foundation in its 3 years of activity has completed numerous projeots to further the knowledge of the frozen food industry. These projects are located in university centers and important work continues to be done.
B. J. A.

(2335) Anon., "Papayas Improved by Freezing." Quick Frozen Foods 9, No. 7, I-II (February, 1947). - Papayas picked in the spring and summer and frozen in a pulped condition are better in taste than the fresh fruit from the trees in fall and winter. R. A. 2, 182-83 (1947).

(2336) Anon., "Scientists Discuss the Case of Ozone in Lockers." Quick Frozen Foods 9, No. 7, 112-13 (1947). - A review.

R. A. 2, 154 (1947).

(2337) Anon., "Practical Freezing Techniques." Quick Frozen Foods 9, No. 8, I-XVI (1947). - A digest of practical techniques of cultivation, harvesting, processing, packaging, and freezing of important frozen foods is given. Included is information on asparagus, peas, corn, lima beans, spinach, broccooli, shrimp, fillets, and poultry.

A. S. C.

(2338) Anon., "Quick Frozen Foods 1947 Equipment Directory." Quick Frozen Foods 9, No. 8, 83-98 (1947). - A rather complete indexed list of freezer equipment wholesalers and retailers.

B. J. A.

(2339) Anon., "Foods Which Have Been Frozen." Quick Frozen Foods 9, No. 8, 100, 102, 104 (1947). - A revised list of foods which have been frozen, either commercially or experimentally. The list is complete and includes also those products which have been processed in laboratories only.

A. S. C.

(2340) Anon., "1946 Frozen Vegetable and Fruit Pack by Container Sizes." Quick Frozen Foods 9, No. 8, 141-46 (1947). - Statistics are given on the following packs from 1942 through 1946 in pounds produced in each region with a breakdown into amount for various container sizes: frozen strawberries, peaches, apricots, cherries, cut corn, peas, spinach, and asparagus.

A. S. C.

(2341) Anon., "Survey Shows Equipment Needs During 1947." Quick Frozen Foods 9, No. 8, 184, 186 (1947).

(2342) Anon., "Forecast of 1947 Pack Trends of Leading Items." Quick Frozen Foods 9, No. 8, 187-89 (1947).

(2343) Anon., "Freezer Warehouse Space in the United States." Quick Frozen Foods 9, No. 8, 194-99 (1947). - A list of cold storage warehouses arranged according to location by state and city.

R. A. 2, 201 (1947).

(2344) Anon., "Strawberries." Quick Frozen Foods 9, No. 9, 59-62 (1947). - Strawberries held 2nd place among frozen fruits in volume of production in 1946. A survey of the growing areas, the production of the frozen pack, and actual freezing methods is given here. In addition, a review of the business and economic outlook for the frozen retail and commercial pack of strawberries is covered.

B. J. A.

(2345) Anon., "Stainless Steel in Frozen Food Plants." Quick Frozen Foods 9, No. 9, 63-5 (1947). - Since sanitation and cleanliness play such an im-

portant role in the frozen food industry, a considerable part is filled by one structural and finishing material, stainless steel. The 18% chromium, 8% nickel composition of stainless steel is that used most for its corrosion resistance and ease of handling. It is used throughout the industry, in processing, liquid handling, packing line, containers, and so forth, as it eliminates the chance of poisoning occasioned through the use of copper, tin, or lead coated metals.

B. J. A.

(2346) Anon., "Kilowatt Use in Frozen Foods Industry." Quick Frozen Foods 9, No. 9, 108, 110 (1947). - The electric and the frozen foods industries are closely related since electric power is needed along the entire freezing production line. For a pack of a billion pounds, as in 1946, there is an estimated consumption of about 300 million kilowatt hours per year, not including the power used in locker plants.

B. J. A.

(2347) Anon., "1947--the Year of Indecision in Packaging." Quick Frozen Foods 9, No. 10, 78-80 (1947). - The continued appearance on the market of various types of packaging makes standardization on one type of over-all packaging seem increasingly remote. The large majority of packages on the market use a combination of bag or liner waxed carton, and a waxed or cellophane, printed or unprinted overwrap. Coming into increasing use are fiber cans, aluminum foil wraps, laminated aluminum foil and printed cellophane wraps as packaging materials. Bag-making machines, automatic handling, and automatic wrapping machines are used increasingly as time savers and cost reducers.

A. S. C.

(2348) Anon., "Electronics." Quick Frozen Foods 9, No. 11, 67-9 (1947). - The applications of electronic heating and cooking in the frozen foods industry are of immediate importance. A general review is given of the various aspects of the electronic equipment to large-scale preparation of food, especially in institutional, country club, restaurant, or railway dining car use.

B. J. A.

(2349) Anon., "First Complete Figures on 1946 Production." Quick Frozen Foods 9, No. 11, I-VIII (1947). - Statistics of frozen pack fruits and vegetables for 1946.

B. J. A.

(2350) Anon., "Locker Plants in Georgia--A Statewide View." Quick Frozen Foods 9, No. 11, 144, 146 (1947). - Georgia now has 159 freezer locker plants scattered over 100 of the 159 counties in the state. Great variety is found in size and in services rendered. There are plants in conjunction with colleges also which train locker personnel. Modern techniques are employed, and new developments are continually being added.

B. J. A.

(2351) Anon., "Export." Quick Frozen Foods 9, No. 12, 51-5 (1947). - During recent months, the frozen food industry has been looking abroad to determine how great, if any, export market exists for frozen foods. The 2 largest

potential markets are South America and Europe. A survey has been made of present conditions and equipment available there for handling cold pack foods. There are numerous drawbacks to exporting to South America now, namely: complete lack of cabinets and refrigerators; the need for a greater consumer education program; the difficulties in transporting frozen foods in such hot climates; their use of the centigrade rather than the Fahrenheit scale; etc. However, a good demand would be found, especially for frozen vegetables and strawberries. Frozen meats are already well-known, and it would be impractical to send fruits since there is a year-round supply of the fresh varieties. Europe needs food of all kinds now, and does not have the dollar exchange or the desire for the luxury frozen foods. Freezing locally is done in almost all the countries, and thus eliminates a market at present for imported goods. Also, there are no freezer cabinets, however, steamship refrigerated space is quite adequate.

B. J. A.

(2352) Anon., "Alcohol Bath Freezes in Forty Minutes." Quick Frozen Foods 9, No. 12, 59,96 (1947). - A million-dollar plant in California freezes food in tin cans by immersion in alcohol. Cans are hand-packed and conveyed to the alcohol bath where they are submerged for 40 minutes, at -30° F.

B. J. A.

(2353) Anon., "New System Used in Freezing Orange Juice Concentrate." Quick Frozen Foods 9, No. 12 I-II (1947). - The Sperti method brings about the concentration of orange juices by partial freezing and centrifuging of water in the natural orange juice. This results in three-fold concentration without undue loss of juice constituents in the ice. It is then canned and frozen at 0° F. It is reconstituted simply by adding 2 parts tap water to one part concentrate and stirring vigorously.

B. J. A.

(2354) Anon., "Trawler Operates as Complete Fish Freezer." Quick Frozen Foods 9, No. 12, II-III (1947); Frozen Food Ind. 3, No. 6, 18-21 (1947). - Giant "King" crabs are caught in the Bering Sea and sorted and cleaned as soon as they are brought aboard the trawler. They then travel on a conveyer belt and are cooked for 17 minutes, deshelled, and passed to freezing trays. Quick freezing is done under pressure with the exclusion of air, which eliminates the chance of freezer burn or deterioration. Frozen crab bars are cut into 12-ounce units, glazed, and wrapped in aluminum foil, ready to be shipped anywhere at any season.

B. J. A.

(2355) Anon., "Georgia." Sou. Canner & Packer 7, No. 13, 53, 55, 57 (1947). - Data are given for Georgia's growth in the production of agricultural products, etc., for 1945. A discussion of the research work under way at the Experiment Stations on frozen foods and their preparation is included. Also, canning data are given. B. J. A.

(2356) Anon., "Fiber Cans Speed First-year Retail Frozen Berry Packs." West. Canner & Packer 39, No. 3, 74-5, 79, 88 (1947).

(2357) Anon., "Navy Makes Tests on Frozen Food Shipments Overseas." West. Canner & Packer 39, No. 5, 75 (1947). - Western brands of frozen foods are

put into a Meese, Inc., zippered, canvas-covered, cork-lined bag, holding capacity 200 pounds, at below 0° F. Then the sealed bags are shipped by air overseas. Both frozen fruits and vegetables are being used in this initial experiment.

B. J. A.

(2358) Anon., "Frozen Standards Meeting Held in Washington, D. C." West. Canner & Packer 39, No. 7, 83-4 (1947). - A news release article giving brief abstracts of the various talks presented by industrial and Federal speakers.

B. J. A.

(2359) Anon., "M. E. Wangenheim is Named Bridgford General Manager." West. Canner & Packer 39, No. 9, 68-71 (1947). - A general discussion of the locker plant, freezing methods used, raw materials and their sources, etc., at the plant at Ontario, Oregon.

B. J. A.

(2360) Anon., "New Rail Refrigerator Car for Frozen Foods is Tested." West. Canner & Packer 39, No. 9, 81 (1947). - New ammonia-expansion equipment now installed in a refrigerator car is able to maintain continuous zero temperature uniformly all over the car. Tests will be made to determine whether this car is more expensive than the bunker reefers and, if so, whether the greater efficiency will compensate for the added cost.

B. J. A.

(2361) Anon., "Quick-frozen Coffee is Introduced by Memo Products." West. Canner & Packer 39, No. 10, 67, 71 (1947). - Discusses the retail package of quick-frozen concentrate of pure coffee, containing six 1-ounce cups which will serve from 18 to 30 cups of hot coffee. The need for freezing the coffee arose from the extremely rapid deterioration of flavor which takes place once the coffee has been roasted.

B. J. A.

(2362) Anon., "Frozen Processing and Storage Facilities Gaining." West. Canner & Packer 39, No. 10, 70-1 (1947). - Present-day public and private freezer-space (0° F.) is now estimated at around 100 million cubic feet, with more plants and equipment being built continually.

B. J. A.

(2363) Anon. Frozen Fruit Defroster and a Labor-saving Filling Cooker. Assoc. Retail Bakers of America, Research & Merchandising Dept., B140, Chicago, n. d.

(2364) Anon., Quick Freezing with Nitrous Oxide as a Medium. Field Information Agcy., Tech.; Office Mil. Govt. for Ger. (U. S.) Final Rep. No. 212, 1947. - Vegetables placed in a special paper carton, which is moisture-proofed by dipping in a plastic, are immersed in nitrous oxide for 20 minutes. The temperature at the center of the package is reduced to -38° C. (-36.4° F.)

R. A. 2, 193 (1947).

(2365) Anon. Family Canning, Freezing, and Storing Budget. Nebr. Univ., College of Agriculture, Ext. Circ. No. 9907, rev., 1947. 2 pages.

(2366) Anon. Ascorbic and Citric Acids in Fruit Products. New York: Pfizer & Co., Inc., 1947. - A comprehensive study is made of the oxidant and browning retardant qualities of ascorbic and citric acids. Discussed also are the stabilizing effects of citric acid, its effect on flavor, proposed levels of treatment, and use of the mixture with various fruits. The effects of different lengths of time of not treating the fruits, treating them with ascorbic acid, and also with a mixture of ascorbic and citric acid are noted.

B. J. A.

(2367) Anon., Development of Research Items for Various Combat Rations: Frozen Precooked Foods. (Q. M. Rept. MIT-13); PB 58,140, n. d. 10 pages. - Supplemental research report on QMC contract projects for period 1 July-31 October, 1945, Sec. III. In continuation of the investigation on frozen precooked foods disoussed in the 1944-1945 annual report (see PB 58,141), bacteriological examinations were made of some of the previously frozen samples which had been in storage for several months at a low temperature. This object was threefold: (1) to standardize a plating technique for determining the total bacterial count; (2) to determine the total bacterial counts for samples of frozen precooked foods now in storage; and (3) to study the effects on the bacterial counts of storage at refrigerator and room temperatures, thawing of sample before plating, heating of sample as in preparation for eating, and delay in freezing after cooking and packaging the food. In addition, the peroxide oxygen values of 9 samples of precooked food after about 7 months' storage were determined, to note the effect on the keeping quality of long storage at a low temperature. Tables are included.

B. S. I. R. 4, 951 (1947).

(2368) Anon., United States Standards for Grades of Processed Fruits and Vegetables (Canned, Dried, and Frozen)., U. S. D. A., Production & Marketing Administration, 1947. 3 pages.

(2369) App, F., "Quick Freezing as an Aid to the Marketing of Produce." Pa. State Hort. Assoc. Proc. 87, 117-21 (1946).

(2370) Ary, J. and McLean, B. B., "Thawing and Cooking of Lamb Legs." J. Home Econ. 38, No. 10, 646-48 (1946). - Lamb legs after being frozen and stored at -10, 0, 10, and 20° F. for 3-5 days were thawed at 40-45° F. and roasted in a 325° F. oven to an internal temperature of 175° F. The average time required for the frozen legs to reach 30° F. in the 40-45° F. cooler was 20-21 hours; 40° F., 32.5-34.5 hours; 43.5° F., 37-38.5 hours. The rate of temperature rise was proportional to temperature differential; the curves converged at 26° F. The cooking time and losses were approximately the same for all methods used. No appreciable differences were observed in eating quality.

R. A. 2, 110 (1947).

(2371) Aschehoug, V. and Spilde, O., "Canning of Meat Products." Tids. Hermetikund 30, 237-44 (1944). - Canning experiments were carried out with raw-packed mutton, beef, and whale-flesh. and with meat-cakes of beef and horse-

meat, meat-balls, and blood-pudding. Experiments were also carried out with beef stored frozen for 3-1/2 months at -18° C.* The canned products of frozen meat compared favorably with fresh packed products.

C. A. 40, 7434, (1946).

(2372) Ashley, W. W., "What is Today's 'Best' in Frozen Foods Packaging?" Food in Canada 6, No. 9, 45-6, 49, 51 (1947).

(2373) Atherton, R. N., Briwa, K., Foss, E. W., and Dorsey, L. M. Food-Freezer Questions Answered. Maine Agrioultural Col. Ext. Ciro. No. 227, 1946. 6 pages.

(2374) Atlung, G., "Some Problems in the Freezing of Ice Cream." Dansk Teknisk Tidsskrift 69, 65-8, 85-6 (April-May, 1945). - An investigation of the influence of freezing on the appearance and conservation of the crystalline structure of ice cream, how the defects (snow, needle, and flake structures) arise, and how they are controlled during processing.

R. A. 2, 35 (1947).

(2375) Augustine, D. L., "Effects of Low Temperature Upon Encysted Trichinella spiralis." Am. J. Hygiene 17, 697-710 (1933). - Raw pork loin roasts, in which trichinous muscle had been inserted, were rapidly brought to low temperatures, varying from -18.1° to -34.6° C., recorded by means of thermo-couples inserted into the trichinous muscle itself. Temperatures as low as -21° produced no demonstrable injury to the parasites, whereas reduced viability resulted from exposure to a temperature of -27.6°. Still greater injury was demonstrated on larvae exposed to -30.9°. Larvae subjected to a temperature of -33.9° produced no infection in test animals although about 12 per cent appeared normal microscopically. Complete destruction occurred at -34.6°. Complete destruction was demonstrated on trichinella larvae brought rapidly to a temperature of -18° C. and there held for 24 hours. It can be concluded that raw pork, in commercial quantities, may be rendered safe, as far as trichinosis is concerned, by either rapidly lowering its temperature to -35° C., or by rapidly lowering its temperature to -18° and holding it for at least 24 hours at that temperature.

Author's Summary.

(2376) Ayres, R. W., "Some Developments in Low Temperature Cabinets." Refrig. Eng. 50, No. 3, 209-11 (1945). - Preferable design for a home freezer cabinet is rectangularly shaped with a one piece top-opening door which is well insulated and counter-balanced. Access to interior can be made by providing lift-out baskets properly cataloged. Insulation thickness should be at least 4 in. but not more than 6 in. The inside tank should be mechanically supported so as not to increase the heat leakage. Thirteen to 25% of the total volume is recommended for a freezing compartment. A hermetic compressor is recommended. There should be a large evaporator area, and the insulation should be sealed against moisture. Food is to be stored at 0° F.

R. A. 1, 26 (1946).

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*Obviously incorrectly reported.

FOOD TECHNOLOGICAL RESEARCH

(2377) Babcock, C. J., et al., "Frozen Homogenized Milk, I. Effect of Freezing and Storage Temperature on the Physical Characteristics of Homogenized Milk." J. Dairy Sci. 29, 699-706 (1946). - Homogenized milk remained normal when frozen and stored at a constant temperature. The length of time it remained normal in the frozen state depended on the freezing and storage temperature. Homogenized milk frozen and stored at -10°C. had a slightly flat flavor when it was thawed at the end of 21 days. At the end of 89 days the flavor was definitely flat and slight separation had occurred. Homogenized milk frozen and stored at -32.8°C. remained normal for 115 days and there were indications that it would remain normal for a longer period. There were indications that homogenized milk frozen and stored at a still lower temperature (-40°C.) would remain normal longer than milk frozen and stored at -32.8°C. Homogenized milk frozen and held at one temperature was moved to a lower temperature without causing any abnormalities to develop, but when it was moved to higher temperature it became abnormal in appearance and flavor. Homogenized milk frozen at -32.8°C. and subsequently stored at a lower temperature (-40° C.) was still normal when thawed at the end of 89 days of total storage time. However, milk frozen at -40° C. and then stored at a higher temperature (-10° C.) was abnormal both in appearance and flavor when thawed if the total storage time exceeded 50 days. When frozen homogenized milk was exposed to room temperature for 30 minutes or more at any time during its storage period with subsequent storage at a temperature higher than the initial storage temperature, its flavor when thawed was either flat or oxidized even though the milk was normal in appearance.

C. A. 41, 2813-14 (1947).

(2378) Babcock, C. J., et al., "Frozen Homogenized Milk, II. Effect of Freezing and Storage Temperatures on the Chemical and Bacteriological Properties of Homogenized Milk." J. Dairy Sci. 30, 49-54, (1947). - When homogenized milk is frozen, the solid components tend to concentrate in the lower portions of the sample. This distribution was not materially affected by changes in freezing and storage temperature. Exposure of the frozen milk to room temperature (23° C.) for less than 4 hrs. did not alter the distribution of milk solids, but at that time there was a significant shift of the solid components toward the lower portion. Changes in the temperature at which the homogenized milk was stored did not materially affect the chemical composition of the different sections of the quart samples. The chemical analyses of various sections of frozen homogenized milk were not affected by exposure to room temperature unless the milk was exposed for 4 hours. When milk was exposed for 4 hours there was considerable increase in the percentage of milk solids in the bottom third and a considerable decrease in the percentage of milk solids in the top third of the quart samples. Homogenized milk that was frozen and subsequently thawed at room temperature changed in physical character. The degree of change depended on the freezing and storage temperature and the length of storage. However, these conditions did not cause any significant changes in the chemical character of the milk. Freezing and storing homogenized milk in the frozen state had a tendency to lower the number of bacteria per ml. This decrease was not materially affected by freezing and storage temperature, by changes in storage temperature, or by exposure to room temperature for 4 hours.

C. A. 41, 2814 (1947)

(2379) Baca, R., "Preparing Frozen Foods." Mex. Sec. de Relac. Exteriors Rev. del Com. Exterior 11, No. 3, 15-16 (1946).

(2380) Bain, E. H.,"Freezing Apples." Sou. Canner and Packer 8, No. 2, 21, 27 (1947). - Blanching and freezing of apples by various means are discussed in a rather general, non-technological manner.
B. J. A.

(2381) Baker, C. T., "Application of Refrigerating Equipment to the Frozen Food Industry." South. Canner and Packer 8, No. 2, 22-23, 26-27 (1947).

(2382) Baker, J. W., "The Fate of the Distributor's Private Label." Quick Frozen Foods 9, No. 3, 82 (1946). - Frozen foods.

(2383) Ballantyne, G., "Refrigeration Problems in Freezing and Storage." Frozen Food Tech. Conf. 1-4 (1946). - A review of the problems presented by quick-freezing vegetables and fruits with today's refrigeration equipment.
B. J. A.

(2384) Balls, A. K.,"Control of Enzymatic Action in Foods." Proceedings of Institute of Food Technologists 165-69 (1943). - The author discusses the inactivation of enzymes, especially peroxidase, by blanching.
B. J. A.

(2385) Banks, A.,"Freezing and Cold Storage of Herring." Inst. Refrig. Proc. 41, 109-27 (1944-45). - Results of experiments at Torry Research Station, Aberdeen, showed that freezing and cold storage could be used for preservation of herrings for at least 6 months if certain precautions were taken; experiments supplemented and extended by pilot-scale trials; during summer of 1944, 137 tons of herrings were frozen, and storage tests are being carried out both at -4° F. and at -20°F.; methods used for freezing.
E. I. 1945, 920.

(2386) Banks, A.,"Cold Treatment of Herrings. Results of Scottish Experiments in Freezing and Cold Storage." Food 14, 151-55 (1945). - A resume is given of the preliminary experimental work on the freezing and cold storage of herring carried out in Aberdeen, together with a detailed description of the two methods (multi-plate contact and air-blast freezing) used in the pilot-scale commercial trials arranged by the Ministry of Food. The main difficulty in the freezing and cold storage of herring is the development of rancidity due to a salt-activated oxidative enzyme system (cytochrome-haemoglobin) catalyzing the oxidation of the fat. This can be avoided by the deposition of a thick ice glaze on the surface of frozen fish prior to storage, together with storage at relatively high relative humidity. Results showed that herring could be preserved by freezing and cold storage for at least 6 months if certain precautions are taken, viz., freezing must be done within 18 hours if the herring are iced, or within a shorter period if not; freezing must be sufficiently rapid, and can be done either in air or brine, provided that in the latter the salt is washed off before glazing; the storage temperature must be adequate.
Br. A. BIII, 189 (Sept., 1945).

(2387) Barker, J., et al., "The Quality of Green Peas Dried in the Frozen State." Food Manuf. 21, 345-48 (1946). - Scalded and cooled peas were frozen by exposure to high vacuum and dried while frozen through the application of heat. These peas were as good as frozen peas. Packing in an atmosphere of nitrogen retarded their slow deterioration. The lower the moisture content, the better was the quality. The degree of scalding prior to freeze-drying affects the keeping quality, insufficient scalding leading to off-flavor development. The loss in ascorbic acid content was slightly higher than with frozen peas unless the moisture content was reduced to less than 2-1/2% or unless the product was packed in an atmosphere of nitrogen at a moisture content of less than 4%. The product is porous and rehydrates readily. The economy of the product is discussed.
C. A. 40, 6185 (1946).

(2388) Barkley, P., "Old Ironfreezers; REA Looks Ahead to Boom in Home Freezers, Uses 3-Section 'Lab' to Find Answers to Freezing Questions." Co-op Power 2, No. 10, 26 (1945).

(2389) Barr, D. E., "To Sell it--Pack it the Way Consumers Want It--Eviscerated." U. S. Egg and Poultry Mag. 48, 288-91, 306 (1942).

(2390) Barr, D. E., "New Horizons for Frozen Food Merchandising." West. Canner and Packer, 39, No. 5, 79-81 (1947).

(2391) Bartlett, A., "Farm Forecast: Colder!" Country Gent. 116, No. 5, 26, 66-8 (1946). - You are taken to farms that are demonstrating the dollars-and-cents value of freezing and chill rooms.

(2392) Barlett, L. H., "Quick-freezing of Foodstuffs." Proc. Trans. Texas Acad. Sci. 27, 56-9 (1944). - The polyphase freezing process is described. Mechanical advantages and desirable operating features of the freezer are summarized.
Br. A. BIII, 173 (Aug., 1945).

(2393) Bartlett, L. H., Specific Heat of Foodstuffs. II. Mathematical and Thermodynamic Determination. Univ. Texas Pub. No. 4432; Bur. Eng. Research, Eng. Research Series, No. 40, 1944. Pages 28-39. - Equations for the rate of ice formation in foods as a function of temperature, the thermal capacity of partly frozen food, and the amount of heat removed during freezing are derived. If it is assumed that the food is a heterogeneous mixture at constant pressure, in thermodynamic equilibrium at a temperature above its eutectic point; that Raoult's law applies; and that the thermal capacity of the solution phase is independent of temperature, and a linear function of concentration, while that of all solid phases present is constant, the only values needed for calculation are initial freezing point, percentage of water in the food, and the thermal capacity of the food in the unfrozen state. Calculated and experimental results for strawberries, and for 10% sucrose solution, over a 25° F. range usually agree within better than 10%.
C. A. 40, 5161 (1946).

(2394) Batchelder, E. L., Kirkpatrick, M. E., Stein, K. F., and Marron, J. M. "Effect of Scalding Method on Quality of Three Home-Frozen Vegetables."

J. Home. Econ. 39, 282-86 (1947). - A comparative study of two scalding media--steam and boiling water--was made especially of asparagus, peas, and broccoli. Tests for palatability, ascorbic acid, and enzyme activity were made on fresh, frozen, and stored samples. Asparagus showed no great difference in palatability and asoorbic acid content after steam and water-scaldings. Water-scalded peas were better on both counts than the steam, while steam-soalding broccoli produced a better tasting product higher in ascorbic acid.

B. J. A.

(2395) Bate-Smith, E. C., "Quick-freezing of Meat." Modern Refrig. 47, No. 560, 267-69 (1944). - Scientific aspects reviewed; analogy of gelatine gels; factors other than rate of freezing affecting drip; principle of quick freezing in handling of meat; subsequent treatment of quick frozen meat; palatability of quick and slow frozen meat.

E. I. 1945, 921.

(2396) Bate-Smith, E. C. et al., Food Preservation, with Special Reference to the Applications of Refrigeration. (BIOS Final Rept. 275, Item 22). Off. Pub. Bd., Report, PB 23808, 1945. 158 pages.- The targets on which reports are given here cover the research institutions engaged in work on the preservation of foods by refrigeration, and commercial firms manufacturing or employing refrigerating equipment for preserving foods; also a limited number of dehydration targets. This report contains in its later sections information on Milei products, butter and cheese-making processes, synthetic fats, and the use of chemical preservatives. Section I of the report is devoted to the work of the Kaltetechnisches Institut, Karlsruhe, 1939-1945, and the Institut fur Lebensmittelforschung, München, 1942-1945. Prior to destruotion by bombs in 1944, both of these institutes were under the direction of Professor R. Plank. His work deals mainly with the properties of refrigerants, thermal conductivity, the performance of refrigerating plant, and the physical aspects of various quick-freezing processes. In the last few years he has been very much concerned with the means of evaluating quality in frozen produce, and a resume of the conclusions is given in Section I of the report. Other subjects discussed here are: packaging materials, dehydration, production of dehydrated food, refrigeration, quick-freezing, cold storage and gas storage, storage of potatoes, and mechanism of oxidation of fats and determination of ascorbic aoid. A bibliography and an appendix listing documents deposited in BIOS Library are included. Section II.A is devoted to German developments in refrigerating equipment for the freezing, transport, and storage of foods. Some of the subjects discussed here are: absorption refrigerators, some special features of German refrigerating equipment, quick freezing equipment, refrigeration equipment for German Armed Services, and refrigeration provided for type XXI submarine. Section II.B describes the application of refrigeration, under the following headings: freezing by immersion in liquid nitrous oxide, concentration of fruit and vegetable juices by freezing, and the preservation of fruits and vegetables by freezing. An appendix contains list of documents deposited in BIOS Library. Section III is devoted to the processing of vegetable produots. The production of unfermented fruit juices by the hot and cold processes is described. Other subjects discussed are: the production of pectinase enzymes of use in the fruit juice industry, including Filtragol, Pectinol, and Pomol; and the manufaoture of peotin. Section IV is devoted to the processing of animal foodstuffs, and includes sections on the dehydration of meat, eggs and milk products, rapid buttermaking processes, and the equipment for mechanical oheese making.

Appendices to this section are: 1. list of Milei offices and manufacturers; 2. account of the development of the new Milei Process (tr.) 3. practical application of production control (Milei); 4. code symbols for materials used in preparation of Milei products; 5. list of documents deposited in BIOS Library. Section V is devoted to chemical preservatives, metallic containers for foods, synthetic fats, and miscellaneous, including water-soluble cellulose derivatives, synthetic lacquer, oil dips for shell eggs, preservatives, sweetening agent (glycerinogen), biosyn, and tetrazonium salt. The original flow-sheets for preparation of synthetic fats from carbon monoxide and hydrogen by the Fischer-Tropsch process have been deposited in the BIOS Library, but copies are included here. Photographs and drawings of machines and refrigeration units described in the various sections of the report are also included.

B. S. I. R. 2, 183 (1946).

(2397) Bate-Smith, E. C., et al., "Food Research in Germany." Modern Refrig. 49, No. 579, 145-48 (1946). - Abstract of findings of team from British Intelligence Objectives Subcommittee (Report Number 275, Item No. 22), H. M. Stationery Office; food preservation in wartime Germany, with special reference to refrigeration investigated.

E. I. 1946, 963

(2398) Bauernfeind, J. C., et al., "Vitamin C Stability in Frozen Fruit Processed with Crystalline l-Ascorbic Acid." Fruit Prod. J. 25, No. 7, 324-30, 347 (1946). - Experimentally and commercially frozen cut fruit processed with crystalline l-ascorbic acid was assayed for reduced ascorbic acid and for total ascorbic acid (ascorbic and dehydroascorbic acid) by the photoelectric method of Robinson and Stotz. Georgia white-fleshed freestone peaches packed in sugar sirup with and without added ascorbic acid, when frozen immediately, showed practically complete retention of total ascorbic acid and of reduced ascorbic acid when held frozen for 1 week. In Hale Haven yellow-fleshed freestone peach packs. the recovery of added ascorbic acid was 10% lower. Holding for 24 hours after thawing resulted in a 50% decrease in reduced ascorbic acid but practically no decrease in total ascorbic acid in Hale Haven peaches. Holding for 4 hours prior to freezing resulted in decrease in both reduced and total ascorbic acid content in white-fleshed peaches but not in Hale Haven peaches. The data presented was too meager to determine whether varietal differences or applicability of analytical procedure was involved. Several methods of thawing Elberta yellow-fleshed peaches were compared, but the data did not show any significant effect on total ascorbic acid content. Holding fruit at temperatures of 15 to 40° F. for one week resulted in a marked decrease in reduced ascorbic acid, and an appreciable but lower decrease in total ascorbic acid content. Fruit removed from 0° F. and held at 32 or 40° F. for one week discolored. Elberta peaches held at 0° F. for 253 to 271 days retained 80% of reduced ascorbic and 90% of total in syrup packs, and 70 and 80%, respectively, in dry sugar packs. Examination of commercial samples showed that thawed fruit, after 8 to 10 months' storage, still retained 80% or more of added ascorbic acid as total ascorbic acid. The reduced ascorbic acid (only the reduced is active as a preservative of color and flavor) content was from less than half to over 80% of total.

R. A. 1, 212-13 (1946).

(2399) Bauernfeind, J. C. and Siemers, J. F., "Methods of Freezing Sliced Apples with l-Ascorbic Acid." Fruit Prod. J. 26, 4-7, 27 (1946). -

Experiments are described on the use of ascorbic acid on an antibrowning agent for sliced apples. The ascorbic acid may be either mixed with dry sugar added to the apple slices (1 ounce with 25 pounds of sugar to 125 lbs. of slices), or the slices covered with a 65% syrup containing 0.1% of ascorbic acid. The pieces of apple should be small to obtain rapid penetration, and "Julienne" slicing is recommended.

Br. A. BIII, 35, (Feb., 1947)

(2400) Bayer, C. M., "Food Prepared and Frozen Rapidly." Hacienda 41, No. 3, 38-41 (1946). - Methods.

(2401) Bedford, C. L., et al., Processes Used in Preservation of Fruits and Vegetables by Freezing with Speoial Reference to Locker Storage. Wash. State Agr. Exp. Sta. Bulletin No. 435, 1943. page 61. - Lima beans, soybeans, string beans, peas, and squash were tested fresh and frozen for vitamin B_1, B_2, and C to determine per cent loss in freezing and subsequent cooking.

B. J. A.

(2402) Bedford, C. L., et al., Locker and Home Freezing of Farm Products. Wash. Agr. Expt. Sta. Popular Bulletin No. 180, 1945. 46 pages.

(2403) Bedford, C. L., "The Use of (Frozen) Fruit Purees in Ice Cream." Ice Cream Trade J. 42, No. 5, 44, 80 (1946).

(2404) Beemer, D. B., "Practical Cold Storage. The Handling of Poultry." Ice & Refrig. 1, 279-80 (1891). - The best way to freeze and pack dressed poultry, etc.

B. J. A.

(2405) Bell, M. H., "U.C.O.'s Refrigerated Warehouse Puts Frozen Foods Distribution into 'Big Business' Class." Food Freezing 1, 92-3 (1946).

(2406) Bell, R. W., "Effects of the Cold Storage Temperature, Heat Treatment, and Homogenization Pressure on the Properties of Frozen Condensed Milk." J. Dairy Sci. 22, 89-100 (1939).

(2407) Bell, R. W. and Sanders, C. F., "The Influence of Milk-fat Globule Size and Milk and Cream Temperatures on the Stability of the Frozen Cream Emulsion." J. Dairy Sci. 28, 581-89 (1945). - Raw and pasteurized 40% cream from uncooled Holstein milk oiled off less after brief storage at -15° C. (5° F.) than did raw and pasteurized 40% cream from unoooled Jersey milk. Similar results were obtained when cream from uncooled milk was compared with cream from milk that was cooled to 10° C. (50° F.) and separated at 25 or 37° C. (77 or 98.6° F.). In general, pasteurized 40% cream oiled off as much as or more than did raw 40% cream after freezing. Differences in milk, especially in the size and number of the fat globules, and changes in the temperature of the milk and cream, greatly influenced the stability of the cream emulsion as measured by the amount of oiling off after freezing and brief storage. Cream cooled in a few seconds over a surface cooler to 5 and 10° C. (41 and 50° F.) was much less resistant

to the destabilizing forces of freezing and brief storage than was cream that was cooled in 10 to 30 minutes with or without moderate agitation and then frozen. Relationships between the viscosity of cream before freezing and the extent of oiling off after freezing are shown.

R. A. 1, 84 (1946)

(2408) Bell, R. W. and Sanders, C. F., "Factors Which Contribute to the Physical Stability of Frozen Cream." J. Dairy Sci. 29, 213-20 (1946). - The factors contributing to the stability of frozen cream are: (1) the use of freshly drawn milk, (2) maintenance of the small, unclumped fat globules in a fluid, disperse state until freezing, (3) quick freezing, and, (4) a storage temperature low enough to prevent any physical changes which may lead to "oiling-off" on thawing. Properly prepared frozen cream will maintain a stable emulsion and a good body when thawed after several months' storage.

B. J. A.

(2409) Berchtold, P., "The Importance of Rapid Freezing by Electricity in Future Provisioning (of the Army) with Food Products." Genie Rural 39, No. 3, 6 (1946).

(2410) Berg, Gunnar., Consultation with the Norwegian Authorities in Regard to Processing and Quick Freezing of Fish. Off. Pub. Bd. Report, PB 34721, 1945. 5 pages. - Visit in September to Norwegian authorities and to plant of "Frost Fillet" at Trondheim. This plant was designed by Solo Feinfrost, G.m.b.H. at Bahrenfeld-Hamburg in conjunction with Nordsee-Hochsee Fisoherei at Wesermunde, Germany. Besides the administration, subjects considered are: handling, filleting, packaging, freezing, and storing.

B. S. I. R. 1, 268 (1946).

(2411) Berg, Gunnar., Investigation of the German Air-conditioning and Refrigeration Industry (Birdseye Process). Off. Pub. Bd. Report, PB 17558, 1945. 35 pages. - Based upon the writer's three months' investigation in Germany, the consensus is that Germany has not developed anything unknown to American industry nor have they produced equipment or shown techniques which surpass those of American manufacture. It is the writer's estimate that the German air-conditioning and refrigeration industry lags behind the American industry on the average by five to ten years. A separate appendix is devoted to a discussion of each of the following: air conditioning, refrigeration, refrigerants, compressors, condensers, evaporators, refrigeration control valves, electrical cycling controls; tubing, piping, and fittings; cabinets. A list of plants visited of interest to the American industry, with a short history of each plant, is included. A list of references in German is also presented. Of special interest are the following translations of three memoranda on deep freezing and cold concentration: 1. "Deep freezing according to Birdseye process", by H. Simanowsky, June 25, 1945. 2. "Deep freezing of fish according to Birdseye process", by Keysler, June 25, 1945. 3. "Cold concentrating process according to Krause-Linde", by H. Simanowsky , July 7, 1945.

B. S. I. R. 1, 1102 (1946).

(2412) Berry, J. A., "How Freezing Affects Microbiological Growth." Food Ind. 4, 205 (1932).

(2413) Berry, J. A., "Some Findings on Microbiology of the Cold Pack." Canning Age 14, 445-46, 463 (1933)

(2414) Berry, J. A. and Diehl, H. C., "Freezing Storage in Relation to Microbial Destruction and Retention of Quality in Sweet Cider." Amer. Soc. Hort. Sci. Proc. 32, 157-59 (1934). - A rapid decrease, as much as 90 per cent or more, in numbers of viable microorganisms occurred in sweet cider frozen in the temperature range -5 to 20° F. for a month. Thereafter, microorganisms were destroyed at a progressively slower rate. The addition of CO_2 was found to accelerate the death rate slightly. Cider did not become sterile from prolonged freezing, though when thawed in unopened containers, its "keeping" qualities showed improvement. Except for short periods, storage of cider at 28° F. did not suppress microbial growth. Freezing preservation of cider was satisfactorily done at -5° F. in airtight or non-airtight containers. At this temperature, the original beverage quality of the cider--color, flavor, and odor--was best retained, and corrosive action on metal containers seemed to be permanently suppressed.
Author's Conclusions

(2415) Berry, J. A., "Microbiology of Frozen Pack Vegetables." Western Canner & Packer 29, No. 4, 14-6 (1937).

(2416) Berry, J. A., Sanitation of Frozen Foods. U.S. Dept. Agr., Bur. Agr. & Ind. Chem. AIC-120. 1946. 6 pages. - Cooling produce to 35-40° F. immediately after harvesting and keeping it cool at all storage points holds down bacterial reproduction. Produce which is to be frozen should not be held for more than 2 hours at 80° F.; 5 hours at 60°F.; 24 hours at 40°F.
R. A. 2, 108 (1947).

(2417) Bess, J. M., "The 'New Dimension' in Profitable Locker Plant Growth." South. Food Processing 1, No 2, 33-4 (1946). - Outlook for farm and home lockers.

(2418) Bess, J. M., "Survey Shows Southern Operators Are Interested in Locker Cabinet Sales." Quick Frozen Foods 8, No. 11, 196-97 (1946).

(2419) Bess, J. M., "Retailers Play Vital Role in 'Frozen' (Food) Quality Control." South. Canner and Packer 7, No. 9, 19-20 (1946).

(2420) Bicknell, M. E., "Frozen Foods Assume Growing Place in Dietetic Field." Hosp. Mgmt. 62, No. 3, 128-30 (1946). - The freezing process arrests enzymatic action and allows a high percentage retention of vitamins and minerals in the products. It apparently inactivates Clostridium botulinum, kills trichina, and increases the tenderness of meats.
R. A. 2, 37 (1947).

(2421) Billardon, R., "Rapid Freezing of Food Products." Casablanca Chambre de Agr. Bulletin 17, No. 178, 5-17 (1946).

(2422) Binkley, A. M., "Vegetables for Freezing." Western Farm Life 49, No. 3, 3, 13 (1947).

(2423) Birdseye, C., "The Future of Frozen Foods." Canadian Food Packer 17, No. 13, 18-20 (1946). - Fresh perishable, canned, frozen perishable, dehydrated perishable, and slow and quick frozen perishable foods are reviewed as competitors in the postwar food markets, and essential points in quality control of frozen food production are given.

B. A. 20, 1620 (1946).

(2424) Birdseye, C., "The Preservation of Foods by Freezing." Refrig. Engineering, Appl. Data 51, No. 2, 1-8 (1946). - An 8-page resumé of the frozen foods industry, its history, theory, methods, processing, packaging, storage, transportation, retailing, and the possible developments of locker plants, together with institutional and farm and home refrigeration.

B. A. 20, 1820 (1946).

(2425) Bishop, R. H., "Home Food Freezers." Refrig. Engin. (Application Data 37) 53, No. 1, 12 pages (1947). - Freezers for urban use should provide 4 cu. ft. storage space per person; 5 cu. ft. for rural use. Cabinets, either chest or upright, should not exceed 29 x 78 x 35 inch over-all dimensions. Construction should be rugged and corrosion resistant with insulation space well sealed. Evaporator coils are wrapped about the food liner, or evaporator plates are provided in the storage space. Freon-12 is the most commonly used refrigerant. Extreme care should be used in construction and assembly; all pipe joints should be double flared or sweated with high silver content solder. Automatic defrosting for the unit is not practical, but means should be provided to aid manual defrosting.

R. A. 2, 197 (1947).

(2426) Bisno, L., "What a Baker Wants in Frozen Fruits." Quick Frozen Foods 9, No. 9, 89-93, 128 (1947). - For uniform bakery products using frozen fruits, there must be a constant percentage of high-quality fruit with good appearance, flavor, and texture, as well as a minimum amount of clear juice. Fruits should be pre-cooled immediately after picking and quick-frozen as soon as possible. The addition of ascorbic acid can control browning of cut fruit. Thawing of fruits must also be carried out carefully to prepare good pies. An examination of the thawed products by packers, dealers, and distributors is recommended in order that they ascertain just what quality of fruit the consumer is buying.

B. J. A.

(2427) Blanco, D. Shall We Let the New Freezing Industry Die (Guatemala)? Assoc. Gen. de Agr. Bulletin No. 83, Guatemala, 1946. Pages 2-3. - Chilled meat industry.

(2428) Bland, F. O. S., "Frost and Food.", Mod. Refrig. 50, 108-09 (1947). - An historical account of technological progress and developments in the frozen food industry in Russia.

B. J. A.

(2429) Boggs, M. M., "How to Cook Frozen Vegetables." Food Freezing 2, No. 6, 421-24, 443 (1947). - Discussion is made of tested methods for cooking frozen vegetables, many of which can serve as a basis for printed instructions for frozen food packages. The most important part of the procedure is the cook-

ing time--the effect of over-cooking is brought out by color, flavor, and texture. The cooking time for strictly fresh pod peas and frozen peas from the same lot was found to be the same. Mild thawing has not been shown as an advantage or disadvantage for most vegetables insofar as quality is concerned. For best quality, vegetables should be served promptly after cooking, and not held over steam tables.

A. S. C.

(2430) Boggs, M. M. and Johnson, G., "How Jellied Cranberry Sauce is Preserved by Freezing." Food Ind. 19, No. 8, 1067-9, 1174-6 (1947). - A method of preparing jellied cranberry sauce, without extensive heating, and subsequent preservation by freezing is described. When freezing was done without added pectin, the gel structure was weakened and synaeresis of gels was seriously accentuated. Frozen gels which contained 0.25 to 0.35 per cent rapid-set, high grade citrus pectin showed good effects in both strength and synaeresis. Uniform results were not obtained when rapid-set apple pectin or slow-set apple and citrus pectins were used.

B. J. A.

(2431) Bohstedt, G., "Frozen Alfalfa as Feed." Hoard's Dairyman 91, 57 (1946).

(2432) Booher, L. E., Hartzler, E. R., and Hewston, E. M. A Compilation of the Vitamin Values of Foods in Relation to Processing and Other Variants. United States Department of Agriculture Circular No. 638, 1942. 244 pages. - This circular summarizes the available data on the vitamin content of foods in relation to variety of plant or breed of animal, method of cultivation or feeding practice, place of production or source of material, method of cooking, processing, storage, variations in degree of maturity, and method of analysis, insofar as such information could be obtained from original published reports. The tables include information on frozen foods.

Author's Summary.

(2433) Bottini, E., "The Use of Freezing in the Preservation of Fruit Products." R. Ist. di Sper. per la Chim. Agr. Ann. 15, Pt. A, 215-56 (1941-45).

(2434) Bottomley, J. W., "Why the Locker is a Good Distributor for Frozen Foods." Quick Frozen Foods 9, No. 11, 128, 164 (1947).

(2435) Brady, D. E., Frei, P., and Hiokman, C. W., "Effect of Freezing Rate on Quality of Broiled Steaks." Food Research 7, 388-93 (1942).

(2436) Brady, D. E., "Quality Frozen Beef Depends on Many Factors." Quick Frozen Foods 7, No. 7, 69-71 (1945). - The quick-freezing of first quality beef is recommended in order to reduce evaporation and drip. Carefully wrapped meat stored at 0° F. or below after a short period of aging heightens the palatability. Temperature, length of storage, and previous handling all have an important effect on the development of rancidity.

B. J. A.

(2437) Brady, D. E., "The Frozen Food Locker Plant, a Market Outlet for North Carolina." Carolina Farmer 1, No. 7, 14-15, 30 (1946).

(2438) Brady, D. E., "More Low Temperature Space in the Locker Plant." Quick Frozen Foods 8, No. 6, 118-19 (1946). - Bulk storage space is recommended in medium and large size plants. Rental rates are compared with those charged by public warehouses.

R. A. 1, 98 (1946).

(2439) Brady, D. E., Jones, I. D., and McAllister, M. L. Freezing Foods for the Home. N. C. State Coll. Agric. & Eng. Ext. Circular No. 280 (Rev.), 1946. 23 pages. - Detailed directions are given for the preparation, freezing, and storage of meats, fruits, and vegetables.

R. A. 1, 213 (1946).

(2440) Brady, D. E., "The Locker and the Home Meat Supply." Quick Frozen Foods 9, No. 8, 256-57, 286 (1947).

(2441) Brady, D. E., "Use the Freezer Locker to Provide a Year Round Meat Supply." Res. and Farming (N. C. Sta.) Prog. Rpt. 5, No. 2, 14-16 (1947).

(2442) Brandt, E., "Reconversion in Frozen Foods." Ice & Refrigeration 112, No. 3, 65-66 (1947). - Disoussion is given of the over-all activity of the frozen-food industry and trends. The status of frozen fruits, vegetables, and precooked foods is presented. A promising future for the frozen-food industry is predicted despite the present-day problems and the fact that the war-expanded types of frozen foods now must meet normal competition.

A. S. C.

(2443) Briant, A. M., Mackenzie, V. E., and Fenton, F., "Vitamin Retention in Frozen Peas and Frozen Green Beans in Quantity Food Service." J. Am. Dietetic Assn. 22, No. 6, 507-10 (1946). - Frozen peas and beans were cooked by 3 common quantity preparing methods; namely, (1) boiling in tap water, (2) reusing remaining water from (1), and (3) steaming without pressure. Thiamin, riboflavin, and ascorbic acid retention was determined and ranges given. The thiamin and riboflavin losses from the vegetables were all found in the cooking water. However, part of the ascorbic acid lost from the vegetables during cooking was found in the cooking water but the remainder was completely destroyed. The palatability of the vegetables decreased progressively with the length of holding time. Those vegetables cooked by boiling water were rated highest in flavor while those cooked by steaming were the lowest.

R. A. 1, 210-1 (1946).

(2444) Briant, A. M., MacKenzie, V. E., and Fenton, F., "Vitamin Content of Frozen Peas, Green Beans, and Lima Beans, and Market-fresh Yams Prepared in a Navy Mess Hall." J. Am. Dietetic Assn. 22, No. 7, 605-10 (1946). - Data and disoussion on the thiamin, riboflavin, and ascorbic acid retention of peas, green beans, lima beans, and market-fresh yams prepared in large quantities under controlled cooking conditions. The vitamin concentration varied widely due to variations in details of cooking procedure, but all three vitamins in frozen vegetables decreased with an increase in length of holding period. The concentration of thiamin and of riboflavin in yams apparently did not change during soaking, cooking, holding, and mashing. The concentration of ascorbic acid in yams decreased during soaking, increased during cooking, and decreased during mashing. R. A. 2, 25-26 (1947).

(2445) Bride, E. L., "Tips on Frozen Pastry." Food Ind. 18, No. 12, 1856-7 (1946). - Many types of frozen foods were tested, including pies, rolls, stollen doughs, and cake doughs. The importance of using high quality ingredients in frozen pies and yeast doughs was emphasized by the tests. Prebaked frozen pies were not satisfactory; frozen unbaked pies were successful. Nine varieties of wrappers for pies were tested. A paraffin-lined cardboard carton was found satisfaotory, as was cellophane with a stockinette overwrap.

R. A. 2, 106 (1947).

(2446) Brisaoher, E., "Frozen Food Prices Must Be Competitive." Canner 104, No. 15, 22, 24, 26 (1947).

(2447) Brisacher, E., "This Is Tomorrow." Sou. Canner & Packer 8, No. 4, 16-18, 24-26 (1947). - The importanoe of catering to the average American consumer in marketing frozen foods is stressed. Frozen foods are not distributed well enough yet, e.g., they are found in only 40% of the grocery stores which cater to the high income group, in only 5% of the medium stores, and in 5% of the ohain stores. There are no frozen foods whatsoever in the stores which sell to a low income trade. These are 1946 figures.

B. J. A.

(2448) Brody, I., "Pheasants Are Quick-Frozen." Quick Frozen Foods 4, No. 7, 30, 39 (1942). - A Seattle man breeds pheasants and wild turkeys as a hobby and has begun to freeze the pheasants in vacuum-sealed cans. Birds are quick-frozen at -30° F. for 48 hours, then stored at 0° F.

B. J. A.

(2449) Broeg, W. E., "Frozen Cream Pastries--Ready to Serve." Bakers' Helper 87, No. 1083, 86, 88, 89 (1947).

(2450) Brown, B. I., "The Future of Frozen Poultry." Butchers' Advocate 121, No. 18, 11, 13 (1947).

(2451) Brown, E., "Meat Retailers Can Sell Frozen Foods." Butchers' Advocate 120, No. 20, 16, 19 (1946).

(2452) Brown, H. D., Kunkle, L. E., and Winter, A. R., Frozen Foods Processing and Handling. Ashville, Ohio: S. F. Hinkle & Sons, 1946. 390 pages.

(2453) Bryan, A. E., "Processing and Quick Freezing of United Kingdon Herring Recommended." Foreign Trade 1, 523-24 (1947).

(2454) Bryant, G. H., "What's Right with the Frozen Food Industry." Frozen Food Indus. 3, No. 3, 24, 38-39 (1947). - General discussion of economio aspects of frozen food industry.

B. J. A.

(2455) Bull, S., "What Is the Future of Locker Plants?" Locker Operator 7, No. 7, 42-46 (1946).

(2456) Burns, V. H., "They (Frozen Foods) Don't Improve with Age." Quick Frozen Foods 8, No. 6, 113-14 (1946). - Frozen foods of all kinds are perishable even in a freezer locker. Pork and ground meats should not be stored for longer than 3-6 months, and all other products not longer than 9-12 months. This practical economy is satisfactory to the patron as well as the plant operator.

R. A. 1, 90 (1946).

(2457) Burns, V. H., "Things to Watch in Building a Locker." Quick Frozen Foods 8, No. 7, 142, 166 (1946).

(2458) Burns, V. H., "Watch Your Equipment." Quick Frozen Foods 8, No. 8, 154, 166 (1946); Ibid. 8, No. 10, 158-9 (1946); 9, No. 3, 145 (1946). - Locker plants.

(2459) Burr, K. O. and Martin, L. S., "Transportation Requirements." Quick Frozen Foods 9, No. 5, 68-69, 102 (1946). - For frozen foods.

(2460) Burroughs, F. S., "Merchandising--Key to Locker Profits." Quick Frozen Foods 8, No. 4, 122-23, 152 (1945).

(2461) Burroughs, F. S., "Coaxing New Locker Customers with Sales, Service, and Variety." Frosted Food Field 4, No. 5, 4-5 (1947).

(2462) Burston, W., "Frozen Food Business Is the Department Store's Opportunity." J. Retailing 23, No. 2, 23-28 (1947).

(2463) Burt, H. B., "The Place of Ice Milk in the Dairy Industry." Ice Cream Field 34, No. 2, 24, 32-3 (1942).

(2464) Burton, L. V., "High Vacuum Techniques Utilized for Drying Orange Juice." Food Ind. 19, 617-22 (1947). - The production of orange juice concentrate and of powdered orange juice by high vacuum techniques includes (1) production of the best possible juice from a suitable blend of oranges; (2) concentrating juice to 50° Brix (5-fold concentration) by evaporation in 2 separate banks of vacuum evaporators at pressure of 12-15 mm. Hg and temperature of 50-55° F.; (3) restoring some of the volatile flavoring principals lost during concentration by combining fresh orange juice with concentrate to bring it down to 42° Brix; (4a) quick freezing the resulting concentrate to 16-18° F. before filling into cans and then completing the freezing in sealed cans in a sharp freezer room at -10° F. (with the initial freezing adjusted to freeze 6-10% of the water as ice, the cans are solidly frozen in 4 hours); or (4b) drying the concentrate to a powder in units maintained at vacuum of 500-700 μHg during the drying cycle and operated in conjunction with a -50° F. trap to freeze out water vapor. Drying is accomplished by evaporation of the concentrate at 50° Brix without prior freezing. The resulting orange juice powder is filled into cans which are run through a clincher and into a vacuum box where the air is pumped out down to 27-28 in. of Hg vacuum, the vacuum is relieved by commercially pure nitrogen gas, and the cans nearly oxygen-free are then sealed.

R. A. 2, 180-1 (1947).

(2465) Burton, M., "New Reefer Car Solves Frozen Food Shipment Problem." Food Ind. 19, No. 7, 906-8, 1024-6 (1947). - A new refrigerator car can maintain frozen foods at 0° F. for long poriods. The car was equipped with split-absorption refrigeration system charged with liquid anhydrous ammonia. Nineteen thermocouples for reading air and commodity temperatures were placed inside the car, and 6 electric resistance thermometers were used to take temperature of the air at the top of the load and under the floor racks. With only 3 inches of insulation on this car commodity temperatures ranged from -4° to 1° F. After 10 days, cartons of tangerine sections were still hard-frozen.

B. J. A.

(2466) Butler, K. D. and Carnell, J., "Home Freezer Users Demand Locker Service Too." News Farmer Coops 14, No. 1, 5-6 (1947).

(2467) Butterworth, J. F., "Tomorrow's (Frozen Food) Packages. VIII. The Use of Petroleum Waxes." Food Freezing 1, No. 6, 296-7, 318 (1946). - A good frozen food package must provide an adequate barrier against the passage of air, water, vapors, grease, odors, and flavors. It must also be easily fabricated, assembled, and sealed. Waxes which may be used for treating containers are (1) paraffin types that are hard, brittle, white, and crystalline, and (2) micro-crystalline types that are dark in color, ductile, tacky, have high melting point, and small crystals. Dry-waxed boards or papers are cheap and light, but are not vapor-proof as some of the fibers are not covered with wax; wet-waxed materials are completely covered on one side with wax, while the other side is uncoated; laminated boards combine desirable qualities of two or more types of materials and are best.

R. A. 1, 214-5 (1946).

(2468) Campbell, H., "The Splitting of Shelled Peas Intended for Freezing." Western Canner and Packer 32, No. 8, 49-50 (1940).

(2469) Campbell, H., "Selection and Pretreatment of Vegetables for Freezing. I-II." Food Pkr. 27, No. 8, 41-2, 74-6 (1946); Food Pkr. 27, No. 9, 52 (1946). - Five important factors in selecting raw material for freezing are: variety, geographical source, maturity, harvesting, and handling between harvest and processing. Proper selection of varieties of peas, corn, and other vegetables may determine the yield, quality of the pack, the continuance of operation, and length of operating season. Geographical location may influence the yields, time of maturity, shape, size, color, flavor, and texture of vegetables. As delayed harvesting means increased yields, growers are apt to err on the side of over-maturity of vegetables. Bruising during handling steps up respiration, increases activity of microorganisms, and reduces the edible quality of the product. Blanching and cooling properly present technical problems in losses of nutrients that require more research, especially the relative value of steam blanching vs. water blanching.

R. A. 1, 212 (1946).

(2470) Campbell, H., "Handling Raw Materials for Food Processing." Refrig. Eng. 52, No. 11, 428-32 (1946). - Flavor, color, texture, and composition of manufactured food products may be substantially altered by microbiological, physiological, and chemical activities occurring in the raw material subsequent to harvesting and prior to processing. These activities are best controlled by rapid, careful handling and low temperature storage. Chemical changes double in rate for each 18° F. rise in temperature. One-day storage of peaches at 80° F. is equivalent to 16 days at 32° F. Gas storage (CO_2) was not found suitable for peaches, apricots, strawberries, and red raspberries; but it gave good results with peas, sweet corn, and carrots.

R. A. 2, 107 (1947).

(2471) Carl, F. L. and Flory, J. Freezer Lockers for Meat, Vegetables, and Fruit. Mo. Agr. Col. Ext. Circ. No. 530, 1946. 23 pages.

(2472) Carlson, C. B., "S. S. Pacific Explorer--a Preliminary Description." Com. Fisheries R. 9, No. 1, 12-7 (1947). - A vessel which can serve as a mother ship for a fleet of 12 or more fishing vessels was equipped as a factory for either canning or freezing tuna, crab, and bottom fish. Blast shelf freezers have a daily capacity of 130 tons of fish. The storage capacity is 3,800 tons of fish. The refrigeration equipment also includes an ice plant with a daily capacity of 15 tons. A 2-stage ammonia compression system provides the necessary refrigeration.

R. A. 2, 202 (1947).

(2473) Carlton, H. Home-Preparation of Fruits and Vegetables for the Freezer Locker. Knoxville: University of Tennessee Agricultural Extension Service Publication No. 280, 1945. 16 pages. - A brief discussion is presented on freezing and storage temperatures, containers and wrapping materials, blanching, the need for prompt handling, the preparation of fruits

and berries for dry pack, sugar pack, and sugar-syrup pack, additional directions for specific fruits, the preparation of vegetables (including blanching), a list of suitable varieties of fruits and vegetables for freezing, care of frozen food in the home, and cooking and serving.

B. H. W.

(2474) Carlton, H., "Frozen Foods in the Retail Market; Frozen Food Stores, Department Stores, and Freezer-Locker Plants to Compete with Retail Food Stores." Food Ind. 18, No. 5, 696-97, 800-02, 804-06 (1946). - Growing consumer demand is one of the most important factors in the great expansion in frozen-food marketing, which has faced indifference by established food industries and the necessity of revolutionary changes in food distribution channels. A discussion of the increasing use of precooked frozen foods and prepackaged frozen meats, and the increasing number of locker plants, department stores, and frozen food stores entering the frozen-food merchandising field is presented.

A. S. C.

(2475) Carlton, H., "Freezer Locker Plant is Going Commercial; Increased Facilities for Freezing Fruits and Vegetables." Food Ind. 18, No. 10, 1542-44, 1672-76 (1946). - Locker operators indicate that they are now freezing, or are planning to freeze, products for local consumption. This trend is a natural and apparently inevitable development. A suggested layout for a 500-locker plant is included.

R. A. 2, 115 (1947).

(2476) Carlton, H., "A Survey of Freezer-Locker Plant Commercial Activities." Food Freezing 2, 284-87, 306 (1947). - Analysis of over 800 replies to a questionnaire regarding activities of U. S. locker plants shows that they are: (1) retailing foods which they have frozen, (2) distributing commercial packs, (3) operating public freezer warehouse space, (4) selling home freezer cabinets, and (5) distributing frozen foods by refrigerated trucks within a stated radius of the plant. Frozen foods packed annually by 63 locker operators are tabulated.

R. A. 2, 200 (1947).

(2477) Carter, F. V., "Differential Temperature Expansion Valve for Low Temperature Applications." Refrig. Eng. 50, No. 1, 39-43, 70-82 (1945).- Results of recent study of characteristics of standard thermostatic expansion valves; constant differential by mechanical design; gas charging limitations; self-starting features; surge control; pulldown superheat control.

E. I. 1945, 919

(2478) Carver, W., "What is the Future in Frozen Food Packaging?" Locker Operator 7, No. 9, 12-4, 20, 55 (1946).

(2479) Cass, T. F., Jr., Clunan, A. B., and Sayles, C. I., "Tomorrow's (Frozen Food) Packages; Economical Carton Varieties." Food Freezing 1, 126-29, 148-49, 176-77, 246-47, 278 (1946). - Transparent rubber hydrochloride film remains flexible at -20° F. and has an almost zero value for its moisture transmission rate. Packages made of this film can be closed by heat sealing, sewing, or by adhesives. Standard methods of reporting the characteristics of packaging materials are needed by the industry.

R. A. 1, 157 (1946).

(2480) Cathcart, W. H., "Retardation of Staling of Bread by Freezing." Cereal Chem. 18, 771-77 (1941). - The staling of bread was not retarded by quicker freezing in a freezing tunnel, nor by variation in the dough formula, nor use of oat flour as an anti-oxidant. Baking and subsequent canning greatly increased keeping properties. Bread sealed in the normal atmosphere and kept for 345 days was still saleable, and that sealed in vacuum was quite similar to fresh bread.

Br. A. BIII, 106-07 (April, 1942).

(2481) Cathcart, W. H., "Defrosting of Frozen Eggs; Old and New Methods of Thawing Solid Product." Amer. Egg & Poultry Rev. 6, 694, 700-01 (1945).

(2482) Cathcart, W. H., "Frozen Bakery Products." Baker's D. 19, No. 5, 26-28, (1945); Frozen Food Ind. 1, No. 1, 32-4 (1945). - Bakeries may use frozen ingredients such as eggs, fruits, and meats; they may freeze partially finished products such as doughs, pastries, or uncooked pies; or they may freeze finished products such as bread, pies, or cookies. More research is needed to determine the amount of decomposition, rancidity, or desiccation that takes place during freezing and storage; also the best method and materials for packaging and the optimum temperature for holding products. High frequency heat defrosters will save much time in thawing large items like loaves of bread and cakes.

R. A. 1, 91 (1946).

(2483) Carthcart, W. H., "High Speed Defrosting of Frozen Eggs by Applying Broadcast Heat." West. Frozen Foods 6, No. 12, 8-10 (1945); Ice Cream Field 46, No. 6,64, 72 (1945). - Previously used methods of defrosting frozen eggs require from 9-63 hours for completion, with an average increase in bacterial count of from 40-1000% during that period and with various undesirable effects on the quality of the defrosted egg mass. Heat must be added uniformly and quickly to preserve the original structure of eggs during defrosting. By the use of high frequency or dielectric heat, defrosting time has been markedly reduced, for instance, from 15 hours to 15 minutes, and the electronic defrosting is so rapid that there is no time for significant chemical changes to occur, and bacterial growth is held to a negligible minimum. Since the presence of metal in a container, even metal stitching, interferes with electronic heating, the development of specially designed containers is suggested. Smaller containers than the conventional 30-pound can or carton would hasten both the freezing and defrosting of the product.

R. A. 1, 92 (1946).

(2484) Cathcart, W. H., "Frozen Foods Defrosted by Electronic Heat." Food Indust. 18, No. 10,1524-25 (1946). - Dielectric heat can be used to defrost eggs and fruits without loss of quality, discoloration due to enzmatic activity, or increase in bacterial content.

B. A. 21, 573 (1947).

(2485) Cathcart, W. H. and Parker, J. J., "Defrosting Frozen Foods by High-frequency Heat." Food Res. 11, No. 4, 341-44 (1946). - Frozen eggs, fruits, vegetables, and fish were defrosted by high-frequency heat with a unit having a power input of 4.6 kw and a frequency of 14-17 megacycles. Both consumer and commercial size packages were used. Defrosting was done both in and out of original containers. Egg yolk defrosted more rapidly than whole eggs or egg whites, and whole eggs more readily than egg whites. Fruits and vege-

tables defrosted more rapidly than did frozen fish. Some comments are made on the commercial application of high-frequency heating.

B. A. 21, 573 (1947).

(2486) Cathcart, W. H. and Beattie, H. G., "Freezing Preservation and the Baking Industry." West. Canner & Packer 39, No. 3, 82-3, 88 (1947). Bakeries are concerned with frozen foods both as a source of raw materials, such as eggs and fruits, and as a means of preserving certain finished bakery products. Since baked pies, rolls, and other pastries may become rancid, stale, or limp in freezing storage, it is necessary that those to be frozen be of better quality than are usually sold fresh. Most bakery products to be frozen should be fully prepared and stored in the unbaked state. It is extremely important that bakery products be packaged so as to prevent desiccation and undue exposure to air.

R. A. 2, 191 (1947).

(2487) Chadoint, E. and Chadoint, M., "The Sale of Fillets of Frozen Fish and the Utilization of Fish Wastes." Rev. Prat. du Froid 2, No. 1, 22-4 (1946).

(2488) Chapman, P. W., "A Study in Southern Locker Plants. I-II." Frozen Food Indus. 3, No. 4, 10-11, 41; No. 5, 16, 33-4 (1947).

(2489) Chenoweth, W. W. How to Preserve Food. Houghton-Mifflin Co., Boston, 1945. 277 pages.

(2490) Christensen, P. E., "Modern Beef Chilling." Refrig. Eng. 39, 296-99, 311 (1940).

(2491) Christensen, F. W., Wegner, M. O., and Kelly, E. Influence of Ration and Storage in Freezer Lockers on the Niacine Potency of Pork. N. Dakota Agr. Exp. Sta., Natl. Coop. Project, 1944. 3 pages. - Supplementing the ration of young hogs with niacin leads to a large increase in niacin content of stored frozen loins, some in hams, and no effect on livers. The microbiological method of determining niacin gives more accurate results than the chemical.

B. J. A.

(2492) Christensen. P. B., "The Warehousing of Frozen Foods." Food Freezing 1, 25, 32-3 (1945). - Cold storage warehouses are being built with more low temperature space and less cooler space, in line with the increase in volume of frozen foods. Freezer storage rooms must be kept at constant temperature and be separated from the freezing rooms.

R. A. 1, 100 (1946).

(2493) Christensen, P. E., "Warehousing in the Distribution of Frozen Foods." Ice and Refrig. 110, No. 1 48-9 (1946).

(2494) Christopher, M., "The Wholesale Grocer has Something on his Mind." Canner 104, No. 7, 9, 10, 24, 26 (1947). - Selling of frozen foods.

One line long

(2495) Church, L. F., "Trends in Commercial Freezing of Fruits and Vegetables." Ice & Refrig. 110, No. 4, 22-4 (1946). - The per capita consumption of quick frozen fruits increased from 0.4 pounds per year in 1937 to 2.2 pounds per year in 1945. At this same rate of increase, consumption will approach 3.0 pounds per year in 1950. In the case of quick frozen vegetables, the corresponding figures are 0.4, 1.54, and 2.25 pounds per year. Charts indicate that if an accelerated growth is assumed, the consumption of fruits in 1950 will be about 5.0 pounds per year and of vegetables about 3.5 pounds per year.

R. A. 1, 160 (1946).

(2496) Chussler, G., "Serve Oven Fresh--We Make 'm...You Bake 'm." Canad. Baker 58, No. 3, 14-6, 18, 21 (1946). - Frozen bakery products.

(2497) Clark, H. W., "Alaska; Veterans' Colony Will Pioneer New Frontier for the Food Freezing Industry." Food Freezing 2, No. I, 20-3, 55 (1946). - The Veterans' Alaska Cooperative Co. plans to: (1) induce veterans to go to Alaska to produce berries and vegetables for trade with U. S.; (2) ship the produce by affiliated cooperative air and steamship lines; and (3) act as agent in this country for the produce grown by members in Alaska. The potentialities of Alaska as one of the greatest producers of products for freezing are emphasized. Cold storage plants have concentrated on halibut, salmon, and cod, while the great profusion of wild berries in southeastern Alaska offer limitless possibilities for processing and freezing. Alaska also has become the leading district on the Pacific coast for freezing fish.

A. S. C.

(2498) Clark, J. H. Tentative Rating of Fruit Varieties for Quick Freezing. N. J. Agr. Expt. Sta. Mimeo. Circ. (unnumbered), Dec. 14, 1944.

(2499) Clark, J. H., "Frozen Pies Equal Fresh Ones in Appearance, Quality, Flavor." N. J. Agr. 27, No. 6, 6-7 (1945). - Apple and peach pies were frozen (a) after baking, wrapped and frozen while hot, (b) after baking, cooled before wrapping, and (c) before baking. They were held at zero to -5° F. for as long as $7\frac{1}{2}$ months before testing for appearance, flavor, and general condition.

M. B.

(2500) Clark, J. H. Frozen Foods. New Jersey Expt. Sta., Circ. No. 500, 1945. 23 pages. - Directions are given for the preparation and freezing of fruits, vegetables, poultry, eggs, meats, and fish in the home or in locker plants. Brief discussions are given of equipment, packages, and how to prepare frozen foods for cooking. Tables include directions for preparation of sugar solutions and salt solutions, suitable varieties of fruits and vegetables for freezing, and length of time for blanching vegetables.

R. A. 2, 38-39 (1947).

(2501) Clark, J. H., "Quick Freezing of Blueberries in Cellophane Packages." Cranberries 11, No. 3, 20-5 (1946). - The ratings of blueberry varieties for quick freezing on the basis of tests during three seasons are given. The importance of sugar in freezing is stressed. Syrup packs were found superior to dry sugar packs in flavor and appearance, a 50% syrup being preferred although 30% syrup was quite satisfactory. With sugar substitutes,

the quality, in all cases, was less desirable than when all cane sugar was used. Blanching was found to be unnecessary and undesirable.

B. A. 21, 453 (1947).

(2502) Clarkson, M. R., "Factors in Design and Construction that Make for Clean Locker Plants." Food Freezing 2, 280-83 (1947). - Before construction is begun the original plans should be discussed with state and Federal authorities in order to meet all their sanitary specifications. Certain floor, ceiling, and wall building materials are more desirable than others in that they add to the general sanitary upkeep of the plant. Adequate lighting and ventilation are desirable. Specific minimum vertical and horizontal distances are given for cattle, calf, sheep, and hog carcasses.

R. A. 2, 162-63 (1947).

(2503) Clunan, A. B., "Tomorrow's Packages; Rubber Hydrochloride Film Returns." Food Freezing 1, 176-77 (1946). - For frozen food.

(2504) Coe, R., "Frozen Foods Research Develops New Load." Elec. World 127, No. 15, 134 (1947). - It is to the advantage of power companies to promote the home consumption of frozen baked goods, since 0.5 kw.-hr. of energy is necessary to freeze one pound of pastry. The Union Electric Co. of Missouri describes its promotional activities in this field, carried on by its home economics department, teaching housewives the proper use of refrigeration facilities as well as cooking procedures.

M. P.

(2505) Colby, L. B., "Frozen Foods: Will Annual Volume Hit Half a Billion in Five Years?" Sales Management 56, 35-7 (1946). - Greatest barrier to expansion of frozen-foods industry is the shortage of equipment, holding back entry of additional companies in the field. The establishment of a distributive structure to cope with demand is greatest problem of marketing. Author feels half-billion dollar volume can be reached in 5 years if problems are met satisfactorily.

A. S. C.

(2506) Cole, W. C., "Use of the Dilatometer in Measuring the Extent of Freezing in Ice Cream and Related Products." J. Agr. Research 56, 137-53 (1938). - Use of the dilatometer method as a basis for measuring amount of ice formed in ice cream, etc., has been tested. Measurements were made on 9 ice-cream, 3 ice-milk, and 4 water-ice samples and results gave the percentages of water frozen from -25° to 0° C. Data are given to show the relation in sucrose solutions between freezing-point depression and concentration. These tests are valuable since quality is influenced by the amount of ice frozen at certain stages of manufacture and distribution.

B. J. A.

(2507) Colston, R., "How to Advise Buying Home Frozen Food Lockers." Better Farming Methods 18, No. 8, 24, 27 (1945).

(2508) Combs, O. B. Freezing Vegetables and Fruits. Wis. Agr. Col. Ext. Circ. No. 357. 16 pages.

(2509) Cook, W. H. and Thistle, M. W., "Refrigerated Transport--the Weak Link in Canada's Frozen Food Industry." Food Freezing 1, 166-67, 190 (1946). - Optimum temperature of 0° F. or below can be provided for foods during initial freezing, storage, retail handling, and in home freezers, but the technical problems of providing low enough temperatures during land transit have not been solved.

R. A. 1, 162 (1946).

(2510) Cook, W. H., "Krause-Linde Concentrator." Food in Canada 6, No. 6, 35, 40, 42, 44 (1946). - Describes a method for the concentration of fluids by freezing.

(2511) Cook, W. H., "Quick Freezing with Nitrous Oxide." Food in Canada 6, No. 7, 22-6 (1946). - The volume of quick frozen foods produced in Germany increased greatly during early war years. One basically new method, developed by I. G. Farben, was based on freezing with liquid nitrous oxide at atmospheric pressure at 137° F.,* but was only in the pilot plant stage. Nitrous oxide was inert toward the color and flavor of common fruits and vegetables. B. A. 21, 573 (1947).

(2512) Cook, W. H., "Portable Refrigerated Storage Boxes." Food in Canada 6, No. 8, 27-8, 30 (1946). - For frozen food.

(2513) Corbett, M. A., "Post-war Problems in Frozen Food Distribution." Natl. Food Distrib. J. 20, No. 5, 35-7 (1947).

(2514) Corley, R. T. and Doan, F. J., "A Study of Concentration and Freezing as a Means of Preserving Fluid Whole Milk." Food Research 5, 369-78 (1940).

(2515) Corman, G., "Pioneer Freezer Manufacturers Carry on Aggressive Consumer Education Program." Food Freezing 2, No. 8, 549, 585 (1947).

(2516) Couderque-Lambrecht, A. De., "The Future of Frozen Fish." Rev. Prat. du Froid 2, No. 1, 1-2 (1946).

(2517) Crosbie-Walsh, T., ed., Food Industries Manual--an Encyclopaedia of Food Manufacture. Fourteenth Edition. London: Leonard Hill, Ltd., 1945. 1062 pages. - Each of the sections of this revised edition is compiled by recognized British authorities. Of 1062 pages, 294 are devoted to the dairy industry; others are Cereals, Canning and Preserving, Meat Products, Pickles and Sauces, Food Dehydration, Storage and Refrigeration, and Packing. Under each section the material is briefly presented alphabetically in encyclopaedic form so that the reader may refer to a particular subject directly without using the index. B. A. 20, 1821 (1946).

(2518) Crosbie-Walsh, T., "British Quick-Freezing Under Way." Food Mfr. 21, No. 10, 417-22 (1946). - Description of a plant in which asparagus, beans,

*Obviously incorrectly reported.

(2519) Crosby, J., "D-A's (Damerel-Allison Co., Inc.) Frozen Citrus Juice." Calif. Cult. 93, 644-45 (1946).

(2520) Crow, W. C., Refrigeration and Frozen Foods. U. S. Dept. of Agr., Production and Marketing Administration, unprocessed I-M-34, 1945. 12 pages.

(2521) Crowe, L. K. and Winn, H. H., "Fresh and Frozen Plain, Superheated, and Sweetened Condensed Skim Milk for Ice Cream." J. Dairy Sci. 23, 1187-99 (1940). - No differences in flavor could be attributed to the type of skim milk used. The use of stored condensed skim milk resulted in slightly lower body and texture scores than when the fresh product was used. Stored frozen superheated condensed skim milk gave a curdy appearance on melting down.

Br. A. BIII, 208 (August,1941).

(2522) Crowther, G. W. When You Buy a Freezing Cabinet. Maine Agr. Col. Ext. Bulletin No. 338, 1945; Conn. Agr. Col. Ext. Bulletin No. 373, 1945. 14 pages.

(2523) Cruess, W. V., "Changes in Dietary Value During Food Preservation." Fruit Prod. J. 21, 40-2 (1941). - A general review of published data, giving the losses during blanching, canning, vacuum concentration, pasteurisation, freezing, etc., of solid constituents, vitamins, etc.

Br. A. BIII, 54 (Feb., 1942).

(2524) Cruess, W. V., "Fruit Concentrates and Their Use." Fruit Prod. J. 21, 165-69, 187, 190 (1942). - A discussion of methods of concentration in vacuum and by freezing. Addition of preservation (benzoic acid or SO_2) is recommended together with storage at low temperatures. Suggestions for use of the concentrates are made.

Br. A. BIII, 218-9 (Oct., 1942).

(2525) Cruess, W. V., et al., "Experiments with Guavas." Canner 100, No. 21, 22-4, 38-40 (1945). - The vitamin C content of 25 varieties of California-grown guavas studied ranged from 55 mg. per 100 gm. in the Earle variety to a maximum of 529 mg. per 100 gm. found in the Rolfs. Other well-known varieties gave the following values per 100 gm.: Hannah 117-254 mg., Hart 195-352 mg., Herradura 62-130 mg., Turnbull 152 mg., Egyptian Seedling 375-399 mg., and Diaz 260 mg. There is no correlation between vitamin C content and the color of the flesh. The pulp of the cooked whole fruit (steamed 10 minutes) held in freezing storage (0° F.) about 5 weeks gave slightly lower average values than the raw outer flesh. Three varieties (Rolfs, Arrons, Seedling) after freezing in syrup, storing several weeks, and thawing, showed variable losses which the authors considered as possibly due to the removal of the vitamin C from the fruit to the syrup. Tabulated results of vitamin C values of the flesh of 6 varieties canned in light syrup showed losses ranging from 0 to greater than 50% of the amount found in comparable raw fruit. Most of the loss is attributed to the diluting effect of the syrup. Moisture content of the raw guavas ranged from 79.7 to 93.3%. Total acid (expressed as citric acid) ranged from 0.37 to 1.46%, with an average of about 0.55 or 0.6%. The pH values ranged from 3 to 4.29, with most commercial varieties falling between pH 3.7 and pH 4.1. Experiments in preparing the guavas as jam, jelly, paste, or nectar, as

well as for canning and freezing, are discussed, and suggestions for obtaining palatable products are given.

B. A. 20, 1482 (1946).

(2526) Cruess, W. V., "Studies of Frozen Food Samples Bought in Open Market. I. Frozen Vegetables. II. Frozen Fruits." Food Freezing 1, No. 5, 243-45, 268; No. 6, 306-07, 322-23 (1946). - A wide variety of frozen vegetables that were obtained from retail stores in the San Francisco area and examined for net contents, color, odor, flavor, and texture after cooking, as well as for catalase and peroxidase activity, showed that many of them were of poor quality and unable to successfully compete with canned vegetables. Underblanching was one cause of low quality. A study of frozen fruits similar to that made on frozen vegetables showed that they were of poor quality, due largely to fluming the fruits, improper sweetening, and incomplete covering.

R. A. 1, 211 (1946).

(2527) Cruess, W. V. and Glazenski, I. G. A., "Frozen Pack Fruit Nectars--Progress Report." Frosted Food Field 3, No. 1, 1, 12-3 (1946); Ice Cream Field 48, No. 1, 42, 65 (1946). - Fruit nectars were made by blending fruit purees and 14-16° Balling syrup, or purees and various fruit juices, and preserving them by freezing or by canning. In every case the frozen nectars stored at 0° F. were far superior to the canned products. Promising nectars are apricot nectar acidified with lemon juice or citric acid, apricot-orange blend, acidified pear nectar, acidified pear-peach nectar blend, acidified yellow greenstone nectar, red plum nectar, red plum-pear blend, guava nectar, and guava-orange or guava-grapefruit blend.

R. A. 1, 204-05 (1946).

(2528) Cruess, W. V., "Blanching and Cooling for Frozen Pack." Fruit Prod. Jour. 25, No. 5, 134-35 (1946). - Water cooling and fluming are objectionable from the standpoint of loss of nutrients and flavor, as evidenced by heavy losses of soluble solids determined by refractive index. Air cooling avoids these objections and appears to be practicable commercially.

B. A. 21, 58 (1947).

(2529) Cruess, W. V., Glazewski, I. G. A., and Seagrave-Smith. H., "Experiments on Frozen Citrus Juices and Syrups." Fruit Prod J. 26, No. 9, 8-10, 25 (1946). - A summary of past and present methods of preparing citrus juices for canning and freezing is given. Vacuumizing and flash pasteurizing are recommended for maximum flavor retention and minimum curdling. Juices heated a few seconds to 190° F. and then quickly cooled curdled only slightly, while slowly frozen juices curdled very badly upon thawing. The longer the storage the more severe was the curdling. Similar results were obtained from the use of Valencia oranges, Navel oranges, grapefruit, and lemons. Sweetening all juices to 50° Brix greatly reduced curdling. Formulas are given for making lemonade syrup, punch syrups, and blended juices for freezing and canning.

R. A. 2, 28 (1947).

(2530) Cruess, W. V. and Seagrave-Smith, H., "Observations on Freezing of Apples." Fruit Prod. J. 26, No. 10, 36-7, 59 (1946). - The necessary steps used in the preparation of apples is given for both steam blanching and sulfite treatment. Of the two methods, steam blanching seems to be preferred in California. Data are presented on the leaching of the solids from the

slices when cooled in running cold water. In the laboratory, the soluble solid dropped from 10.8% in the raw samples to 2.1% in the steam blanched samples when cooled for 10 minutes in water. Flavor was also reduced. Blanched slices cooled in air to 72° F. in less than 4 minutes were satisfactory, and this method seems preferable to cooling with water since it does not leach out the soluble solids.

R. A. 2, 27 (1947).

(2531) Cruess, W. V. and Smith, H. S., "Better Blanching Needed." Quick Frozen Foods 8, No. 12, 57 (1946). - Half or more of commercial samples of 10 frozen vegetables packed in 1944-5 and bought at retail gave a positive peroxidase reaction. In general, positive samples gave a poor flavor. Since blanching of vegetables sufficient to inactive peroxidase is necessary for retention of quality during frozen storage, more attention should be given by packers to the operation. Blanching to inactivate catalase is not enough.

B. A. 21, 198-99 (1947).

(2532) Cruess, W. V. and Glazewski, I. G. A., "Vegetable Juices Present Opportunities." Quick Frozen Foods 9, No. 2, 67-9 (1946). - Methods of extracting many vegetable juices and formulae for blending them into appetizing drinks are discussed. Juices frozen after being homogenized showed excellent flavor, texture, and odors, whereas, raw juices stored at 0° F. showed severe curdling and a stale odor and flavor on thawing. Tomato juice to which 5 per cent lemon juice has been added freezes well and has an added zest in flavor as well as in nutritive value.

B. J. A.

(2533) Cruess, W. V., "Blanching—its Frozen Pack Importance." Canner 104, No. 2, 62, 64 (1947). - Many samples of 10 kinds of frozen vegetables were collected from the market and tested for efficacy of blanching. Most of them were underblanched as indicated by positive peroxidase tests, bleaching of color, and presence of haylike flavor and odor. Blanched products should be cooled in a high velocity (600-1000 ft. per min.) stream of air rather than in water in order to reduce leaching.

R. A. 2, 108 (1947).

(2534) Cruess, W. V., Seagrave-Smith, H., and Glazewski, I. G. A., "Frozen Concentrate Makes Fresh Lemonade." Quick Frozen Foods 9, No. 9, 86-7 (1947). - Juice should be extracted from clean, disease-free fruit, centrifuged to remove excess oil, deaerated under 28-29 in. vacuum, pasteurized at 190-195° F. for 1 minute followed by rapid cooling, sweetened to 50° Brix, packaged in metal or heavily paraffined cartons, and frozen as quickly as possible. Lemonade made from such a concentrate was excellent after being held 2 years at 0° F.

R. A. 2, 182 (1947).

(2535) Cruess, W. V. and Seagrave-Smith, H., "Frozen Citrus Juice." Quick Frozen Foods 9, No. 10, 51-5, 107 (1947). - A survey of growing areas, production, and freezing methods is combined with a review of the business and economic outlook for the frozen retail and commercial pack. The potentialities of frozen citrus juices on the market are considered to be very great. A common defect of frozen orange juices has been curdling, which homogenizing appears to retard. The enamel-lined tin can, the fiberboard metal-ended "can", or the paper milk bottle are favored as containers, rather than the

cellophane bag-in-carton or the glass container for frozen juices. In order to minimize oxidative changes and to improve physical texture of the juice, deaeration is advised.

A. S. C.

(2536) Cutting, C. L., "The Effect of Refrigeration and Dehydration on the Composition, Keeping Quality, and Culinary Properties of Fish." Proc. Nutrition Soc. (Cambridge) 2, No. 1-2, 113-20 (1944). - Storage in ice, freezing, cold storage, dehydration, and canning produce changes in chemical composition, the keeping quality, and the culinary properties of the different products; these are briefly discussed. The protein fractions of fresh and frozen haddock muscle are given, also the storage life of gutted white fish, ungutted herrings, smoke cured white fish, and kippers at -10° C., - 20° C., and -30° C.

B. A. 21, 817 (1947).

(2537) Dahlberg, A. C. and Penczek, E. S. Dextrose and Corn Syrup for Frozen Desserts. N. Y. Agric. Exp. Sta. Bull. No. 696, 1940. 36 pages. - The use of glucose and maize syrup (I) in ice creams etc., is investigated. The effects of sweetness, f. p. depression, acidity, density, sandiness, and fat-clumping are discussed. The replacement of 25% of sucrose by (enzyme-converted) (I) is recommended.

Br. A. BIII, 155 (June, 1941).

(2538) Dahle, C. D., "Frozen Cream." Ice Cream Field 34, No. 1, 21 (1939).

(2539) Dahle, C. D., Lawhorn, R. K., and Barnhart, J. C., "Factors Affecting the Keeping Quality of Frozen Cream." Proc. Int. Assoc. Ice Cream Mfgrs. 2, 7 (1940).

(2540) Dahle, C. D., "Frozen Cream; a Review." J. Dairy Sci. 24, 245-64 (1941).

(2541) Dana, A. W., "How to Compare Costs of Vegetables--Fresh--Frozen--Canned." Quick Frozen Foods 9, No. 7, 84 (1947).

(2542) Darby, Hugh H., "Clarence Birdseye--the Man Who Lost his Name to Frozen Foods." Better Food 51, No. 10, 32-3, 59 (1946). - Biographical sketch.

R. A. 1, 181 (1947).

(2543) Darrow, George M., "Strawberry Breeding by the United States Department of Agriculture." Fruit Varieties & Hort. D. 2, 23-5 (Spring, 1947). - The main objectives in strawberry breeding have been (1) to develop varieties resistant to diseases such as leaf scorch, leaf spot, red stele root disease, and virus troubles, (2) to improve firmness and carrying quality, (3) to get better dessert quality, (4) to develop varieties particularly adapted to freezing and making preserves, and (5) to develop winterhardiness. The varieties are listed that have been used to obtain the characteristics desired.

R. A. 2, 181 (1947).

(2544) Daughters, M. R., "The Flavor and Texture of Frozen Vegetables." Quick Frozen Foods 9, No. 5, I-II (1946). - The haylike flavor of frozen vegetables is commonly due to under-blanching but may also be caused by absorption of foreign juices during preparation, by contacting unclean equipment during processing, or by the action of molds, yeasts, or bacteria. Poor texture of frozen vegetables may be the result of unfavorable weather conditions during the last few days prior to harvest; over-maturity; the use of a variety unsuitable for freezing; or the use of hard water.

R. A. 2, 94 (1947).

(2545) Daughters, M. R. and Glenn, D. S., "Role of Water in Freezing Foods." Refrig. Eng. 52, No. 2, 137-40 (1946). - The specific heat and the bound water content of several varieties of asparagus, corn, beans, peas,

rhubarb, spinach, raspberries, and strawberries were determined by the colorimetric method. The percentage of bound water in frozen peas at -20 to -21° C. (-4.0 to -5.8° F.) averaged 5.0% for small peas, 4.1% in medium, and 5.7% in large peas. Golden Bantam corn contained about 34% bound water; green beans about 5%; rhubarb and spinach had less than 1%; strawberries varied from 2% to 6%. The bound water content of frozen food is believed to be related to keeping quality in freezing storage and to changes in texture on defrosting.

R. A. 1, 213-4 (1946).

(2546) Davidson, B. D., "Refrigerated Motor Truck Service for Frozen Foods." Ice and Refrig. 110, No. 1, 50, 73 (1946).

(2547) Davis, E., Muir, J., and Sperry, T. A. Freezing Farm Products. Wash. State Col. Ext. Bull. No. 230, revised, 1946. 20 pages. - General instructions are given for the preparation, freezing, and storage of fruits, vegetables, meats, poultry, eggs, and fish in the home freezer or locker.

B. J. A.

(2548) Day, D. I., "Effective Selling of Cold Storage Locker Service." South. Food Processing 2, No. 5, 13-4 (1947).

(2549) Dearing, A. P., "Future of Frozen Foods Depends on Proper Packaging." Food Indust. 18, No. 8, 1196-7, 1312, 1314, 1316 (1946). - Food technologists must cooperate with packaging industries to establish proper packaging specifications; sales appeal, product protection, production requirements, labor and material costs are essential factors to be considered.

E. I. 1946, 432.

(2550) Dearing, A. P., "Proper Selection of Materials for Frozen Food Packaging." Food Pkr. 27, No. 6, 44, 46 (1946). - Frozen food packages should protect the product against loss of moisture, bacterial contamination, and change in color and flavor in the product; should be easily filled, stored, and emptied; should be economical in filling, handling, and storing; and should be adapted to automatic equipment. The merits of metallic vs. nonmetallic containers and round vs. rectangular shaped containers are discussed. Flexible materials for packages are cheaper to buy, assemble, ship, and store.

R. A. 1, 214 (1946).

(2551) Dearing, A. P., "Looking Ahead in Packages." Frozen Food Indus. 2, No. 4, 16-7, 49-50 (1946). - Industry's food technologists must establish standards for packaging in order to insure adequate frozen food protection.

B. J. A.

(2552) Deins, C. A., "Quality Control of Quick Frozen Foods." Butchers' Adv. 118, No. 6, 10-12 (1945). - The future of the frozen foods industry is based on quality as determined by the homemaker. Advertising has stimulated a tremendous desire for frozen foods, and it remains for the producer and processor to live up to the homemakers' expectations.

R. A. 1, 38-39 (1946).

(2553) Denman, C. B., "Developments in Refrigeration May Affect the Way Dressed Poultry is Sold." Am. Poultry J. 76, No. 10, 7, 20-1 (1945). - The rapid increase in the number of freezer units installed in retail stores and in homes will create a larger demand for frozen eviscerated poultry.
R. A. 2, 102 (1947).

(2554) Den Dooven, K. C., "How to Prepare Refrigerated Sweet Doughs; Part III." Baker's Helper 85, No. 1057, 67-8, 72 (1946).

(2555) Diehl, H. C., "What's to be Done About Quality Control?" Food Freezing 2, 74, 76-8 (1946); Wash. Packer 12, No. 5, 2 (1947). - Frozen foods.

(2556) Diehl, H. C. and Havighorst, C. R., "Progress and Prospects of the Frozen Food Industry." Food Industries 17, 261-78 (1945).

(2557) Diehl, H. C., "Research; Many Long-Range Projects Planned." Frozen Food Indus. 2, No. 3, 14, 37 (1946). - In the frozen food industry.

(2558) Diehl, H. C., "Need of Technological Supervision in the Selection, Preparation, and Freezing of Fruits and Vegetables." Quick Frozen Foods 8, No. 6, 70 (1946). - Quality in frozen foods is largely determined by care in selection of raw material of suitable variety, culture, and maturity. The necessity of keeping produce cool between field and plant is stressed. Quick freezing will not correct defects. Engineers must give attention to thermal properties of refrigerated foods, and plant breeders to the development of more suitable strains.
B. A. 20, 1214 (1946).

(2559) Diehl, H. C., "Need of Technological Supervision in the Food Industry. With Special Reference to the Selection, Preparation, and Freezing of Fruits and Vegetables. Parts I and II." Refrig. Engineering 51, No. 2, 123; No. 3, 223 (1946). - Part I. As the industry emerges from wartime conditions to peacetime competition, common quality standards must be established. Raw materials must possess the highest quality within economic limits; basic research must be devoted to all aspects, including biological varieties, nutritional values, composition, stage of maturity for harvesting, and protection of desirable constituents. The practical aspects of the industry have thus far been emphasized. "Quick freezing" is in itself not the answer to the quality problem. Thermal characteristics of refrigerated foods will provide more accurate data for the design of economical and efficient industrial plants. The geneticist and the refrigeration engineer must collaborate; the latter may find his services extending to the field to provide chilling protection before the food reaches the plant. Part II. Pre-cooling harvested produce before it is processed for freezing, and bacterial control in all parts of the frozen food plant are very necessary. All phases of the frozen fruit or vegetable industry must be considered, from field production to consumer information on proper utilization of the products; satisfactory refrigeration applications are entirely adequate, but research must be given to improving the physical and nutritive qualities of frozen foods.
B. A. 20, 1821 (1946).

(2560) Diehl, H. C., "Refrigeration Research Foundation--Third Annual Report of Director." Ice & Refrig. 112, No. 2, 33-6 (1947). - A review of the Foundation's 25 active or completed projects.

R. A. 2, 71 (1947).

(2561) Dillon, C. E., "How Locker Operators Can Profit from Inedible Rendering." Meat Merchandising 21, No. 12, 90-2, 94, 96, 98, 100 (1945). - Complete details on how lockers can utilize all inedible by-products and turn them into added profits.

(2562) Dillon, C. E., "Tips on Increasing Profits in the Locker Plant." Frozen Food Indus. 3, No. 2, 26-7, 50-1 (1947). - Management.

(2563) Dirks, A. V., "To Can or to Freeze." Good Housekeeping 124, No. 6, 126-27 (1947). - Fruit and vegetables.

(2564) Doan, F. J. and Featherman, C. E., "Observations on Frozen Milk." The Milk Dealer 27, No. 3, 33-4, 62 (1937).

(2565) Doan, F. J. and Leeder, J. G., "Milk as a Frozen Food. (A Preliminary Report on Technical Aspects)." J. Dairy Sci. 27, 683-84 (1944). - Milk is pasteurized for 15 minutes at 180° F., then concentrated to a ratio of 3 to 1. Hot milk is then homogenized at high pressure (3,000 lb.), cooled, and frozen. Freezing storage must be maintained at -10° F. Reconstitution is accomplished merely by placing the frozen block in the correct volume of water at 180° F. and letting it melt.

B. J. A.

(2566) Dodds, M. L., et al. Retention of Ascorbic Acid in Vegetables Served Army Units. Tenn. Agr. Expt. Sta. Progress Notes No. 1, 1944. 6 pages. - Calculation of retention on a wet basis was unsatisfactory because the same amounts of raw and cooked food were not equal in terms of the original commodity. Retention based on dry weight was satisfactory only if the only change were moisture. When seasoning was added, changes in dry matter resulted. When additions were made to the vegetables in cooking, the actual retentions were greater than the calculated values. Potatoes were sampled from November through April. The ascorbic acid (I) values fell steadily from 20 to 6 mg./100 g. Mashed potatoes furnished practically no (I). Baked potatoes retained an average of 43.1%; potatoes steamed in their own skins, 60.3; and potatoes pared and steamed, 38.9. Sweet potatoes retained their (I). The potatoes lost little (I) over a 3 months' storage period. The average retention of (I) in winter varieties of cabbage was 29.2%; in spring varieties, 24.8%. Smaller heads appeared to have a higher content. Frozen green beans were low in (I) and retained only 9.0% in the cooked product. Green peas showed an average retention of 28.7%. Swiss chard retained 18.4%, and spinach, 28.1%. C. A. 41, 1346 (1947).

(2567) Dodds, M. L., et al. Interfering Factors in Calculations of Retention of Nutritive Value of Food. Tenn. Agr. Expt. Sta. Progress Notes No.2, 1946. 5 pages. - The purpose of the experiment was to demonstrate that the nutritive value of foods served in institutions cannot be predicted accurately, even though vitamin losses based on dry weight are known, because of the interference of such factors as seasoning and losses of material during manipulation. The addition of salt in cooking cabbage caused a 12% increase

of the original dry weight. The addition of fat resulted in variable dry weights. When wet weight was considered as the basis of vitamin values, solubility losses as high as 25% occurred causing discrepancies. Similar discrepancies in both dry and wet weight of cooked frozen spinach with seasoning and fat occurred. A comparison of the reduced and dehydro form of ascorbic acid showed that a partial conversion of dehydroascorbic acid occurred during preparation. The authors conclude that much of the work of the National Co-operative Project on conservation of nutritive value of foods cannot be used to calculate losses or retention of vitamin values during institutional cookery but that data on the vitamin ranges of foods have been secured.

C. A. 41, 1766 (1947).

(2568) Dolph, J. C., "Frozen Food Delivery--Dallas War Veterans' Idea Clicks With Housewives." South Refrig. J. 1, No. 5, 15 (1946).

(2569) Doremus, M. and Stauck, M. Food Preservation by Freezing. Nebr. Agr. Col. Ext. Circular No. 9965, 1945. 16 pages. - A review of home freezing practices and procedures.

B. J. A.

(2570) Dove, W. F., "Developing Food Acceptance Research." Science 103, No. 2268, 187-90 (1946). - Food acceptance research is a new branch of science which treats of foods and the consumer of foods as a relationship in which the producer or processor of foods (for industrial survival) and the consumer of foods (for human survival) share an equal interest.

B. A. 20, 1091 (1946).

(2571) Drayton, L. E. Frozen Food Locker Plants; with Special Attention to Co-operative Organization. Saskatchewan, Canada, Dept. Co-op. and Co-op. Devlpmt. Bull. No. 3, 1946. 63 pages.

(2572) Drew, D. E., "Tomorrow's Packages--Regenerated Cellulose Film and its Frozen Food Applications." Food Freezing 1, No. 3, 101 (1946). - The basic properties which render transparent regenerated cellulose film an indispensable adjunct to quick-frozen foods are: moisture- and air-proofness; strength; flexibility; resistance to liquid, grease, and odor; temperature stability; sealing; printability; coverage; and transparency. It is available in sheets, rolls, trays, and bags. Third of a series.

B. A. 20, 1821 (1946).

(2573) DuBois, C. W., "Better Refrigeration Methods Needed to Harvest and Process Shrimp." Ice & Refrig. 110, No. 2, 19-21 (1946). - Shrimp deteriorate within 8-12 hours if not refrigerated, and even when packed in crushed ice they remain fresh for only about 2 days. Few boats are equipped with mechanical refrigeration, and almost none provide freezing facilities aboard. There is need for quicker refrigeration and lower temperature in the shrimp industry.

R. A. 1, 154 (1946).

(2574) Dunsford, H. W., "Quick Freezing Technique." Mod. Refrig. 48, 283-84 (1945); Inst. Refrig. Proc. 42, 63-8, 69-74 (1945-46). - A general

article describing methods of preparation, packaging, freezing, storing, and transporting frozen foods in England. Special attention is given to sanitation in the plant, proper packaging, and the maintenance of a low storage temperature.

R. A. 1, 94 (1946).

(2575) Ebert, S. G., "Frozen Foods, a new Billion-dollar Baby." Barron's 26, No. 10, 11 (1946). - The frozen foods industry will give birth to many new businesses as it grows: packaging, retailing of frozen goods, distribution of freezing equipment. Price differential will probably lessen as the industry expands, so that frozen foods will compare so favorably with fresh perishables as to eliminate the "seasons" for fresh foods.
M. P.

(2576) Ebert, S. G., "Frozen Foods Business Climbing out of Pitfalls." Barron's 27, No. 14, 6 (1947). - Overcrowding of producers in 1946 in the frozen foods field resulted in many failures. Experience gained by surviving packers will lead to improved quality, and possibly increased production. Limiting factor in field is home freezer capacity. Aggressive advertising is necessary to put over products to public.
M. P.

(2577) Edwards, G. T., "How Beans Are Oven-baked for Freezing." Quick Frozen Foods 5, No. 9, 23 (1943).

(2578) Eickelberg, E. W., "Quality Starts in the Field." Quick Frozen Foods 9, No. 12, 56-8 (1947). - Quality of basic raw materials is dependent upon the seed or nursery stock planted, growing conditions, soil fertility, the stage of maturity at harvesting, and upon proper handling to retain the desirable qualities in processing to and at the freezing plant.
B. J. A.

(2579) Erdman, F. S. Building a Home Freezer. N. Y. Agr. Col. (Cornell) Ext. Bull. No. 705, 1947. 30 pages.

(2580) Esselen, W. B., Jr., Powers, J. J., and Woodward, R., "d-Isoascorbic Acid as Antioxidant." Indus. & Eng. Chem. 37, No. 3, 295-99 (1945). - As previously reported, d-isoascorbic acid possesses significant anti-oxidant properties toward l-ascorbic acid (vitamin C) in pure solutions; these findings have been reaffirmed by oxidation-reduction potential studies; it appears that d-isoascorbic acid may prove to be of value in stabilizing color, flavor, and ascorbic acid (vitamin C) content of processed fruit juices and other foods. E. I. 1945, 435.

(2581) Esselen, W. B., Jr. and Powers, J. J., "The Use of Calcium Salts in Freezing McIntosh Apples." Fruit Products J. 25, 200, 202, 217 (1946). - Treatment with calcium salts has been found to be very effective in preventing processed McIntosh apples from becoming soft and mushy in baking and cooking. Kertesz in 1939 first demonstrated that calcium reacts with fruit pectic acid to add firmness to the tissues. Test results showed that untreated apples were quite soft and mushy, whereas treated apples maintained their shape very well after baking. Calcium treatment had more effect on frozen and fresh apples and had no effect on their flavor.
B. J. A.

(2582) Esselen, W. B., Jr., Hart, W., and Fellers, C. R., "Firmness in Frozen Sliced Apples." Quick Frozen Foods 9, No. 5, II (1946). - Treating apple slices with calcium chloride solution prior to freezing was found effective in retaining their firmness. A dipping time of 5-10 minutes in a 1% solution was found adequate for most apples. Similar results also may be obtained by blanching the slices in a solution of 0.05-.1% of the salt, or by adding the salt directly to the solution if sulfur dioxide is used.
R. A. 2, 97 (1947).

(2583) Esselen, W. B., Jr. and Fellers, C. R. Mushrooms for Food and Flavor. Mass. Agr. Expt. Sta. Bull. No. 434, 1946. 11 pages. - The proximate composition, the ultimate protein, carbohydrate, and vitamin content of the cultivated mushroom, Agaricus campestris, and the effects of cooking, canning, drying, and freezing upon these nutrients are reviewed.
C. A. 41, 2818 (1947).

(2584) Esselen, W. B., Jr., Lawler, K. M., and Fellers, C. R. Home Freezing in Massachusetts. Mass. Agri. Expt. Sta. Bull. No. 437, 1947. 27 pages.

(2585) Evans, E. J., "Standardization and Inspection of Frozen Foods." Southern Food Processing 1, No. 6, 8, 26 (1946).

(2586) Evers, C. F. and Hutchings, B. L., "Quality Control in the Packaged Frozen Fruit Industry." Fruit Prod. J. 26, No. 1, 136-43 (1947). - General directive influences on quality control are exercised by national and regional industry organizations, Federal Food and Drug Administration, and USDA Production and Marketing Administration. Management should assume responsibility for acceptable standards and establish a quality control department headed by a food technologist with industrial experience and provide a suitable space and equipment for the laboratory. An important part of quality control consists in the periodic checking to determine that the accepted standards are maintained and in making an accurate record on printed daily physical control reports. A suggested report form based on USDA Tentative Standards for Grades of Frozen Peaches is shown. Factory inspection includes condition and amount of raw material, time and temperature of peeling, temperature of cooling water and of product at time of fill, ingoing weights of fruit and sirup, sirup density and temperature, and freezing time and temperature.
R. A. 2, 107 (1947).

(2587) Fabian, J. R., "Frozen Meats; an Analysis of Future Problems in This Vital Market." Frozen Food Indus. 1, No. 2, 12-13, 53-5 (1945).

(2588) Fabian, J. R., "Huge Outlet for Farm Freezers." Frozen Food Indus. 2, No. 10, 8-9, 44-5 (1946). - Rural Electrification Administration's new principles of extending electric service to farm areas now provides power for 3,000,000 farms which use twice as much current as they did in 1937. The 5-year plan to double present consumption will intensify this huge untouched, half-billion-dollar market for home freezers, walk-in refrigerated rooms, and other such equipment.

B. J. A.

(2589) Fabian, J. R., "Food Chains and Frozen Foods." Frozen Food Indus. 2, No. 1, 1[illegible]-5, 41-6 (1946). - Marketing of frozen foods by chain stores.

(2590) Fabian, J. R., "Microbial Growth and Quality Control." Frozen Food Indus. 2, No. 7, 8-9, 39-41 (1946). - For microbiological reasons a storage temperature of 15° F. is the highest permissable in frozen pack since this is the minimum time for growth of microorganisms. Since frozen foods are not sterile, syrups are usually used which exert a preservative action and retard growth of bacteria when the product is thawed.

B. J. A.

(2591) Fabian, J. R., "What Size Container?" Frozen Food Indus. 2, No. 11, 20-1, 38, 43 (1946). - Recommended are uniform packages of 12-ounce, 40-ounce, and 10-pound sizes which are multiples of one another. The space occupied by 2 of the 10-pound cartons can be taken up by 24 of the 12-ounce or 12 of the 40-ounce packages.

B. J. A.

(2592) Falcioni, A. C., "Industrial Freezing." Chacra 16, No. 182, 60-1 (1945). - Methods of preservation of food by cold, such as cold storage and freezing.

(2593) Farlow, P. R., "Mid-America Offers Advantages to Freezing." Quick Frozen Foods 9, No. 9, 90-1, 127 (1947). - The Mississippi Valley area's potentialities for growing and freezing foods have just begun to be tapped. Transportation facilities make it possible for this area to serve both east and west easily.

B. J. A.

(2594) Farquhar, B., "College Short Courses at Ohio State and Kansas State Turn Out Trained Locker Personnel." Food Freezing 1, 208-09 (1946).

(2595) Farquhar, B., "A History of the Locker Plant." Quick Frozen Foods 9, No. 8, 254-55 (1947).

(2596) Farris, W. S. 27 Floor Plans for Locker Plants. Ark. U. Bur. Res. Inform. Serv. No. 3, 1947. 30 pages; Frozen Food Industry 3, No. 3, 16-17, 33; No. 4, 16-17, 42; No. 5, 12-13, 36; No. 7, 22-3 (1947).

(2597) Roberts, W. L., Felder, A. P., Smith, M., Hunter, F. M., Richmond, W. L., Hines, C., Buckley, K. H., and Haddon, M. Freezing Farm Foods For Home Use. Miss. State. Col. Ext. Bull. No. 136, 1946. 32 pages. - Rather complete directions are given for the preparation of fruits, vegetables, poultry, and meat for home freezing, as well as directions for thawing and cooking.

B. J. A.

(2598) Felder, A. P., "Processing Fruit and Vegetables for Freezer Storage." Quick Frozen Foods 9, No. 6, 131 (1947). - General instructions for home or locker plant freezing done by the individual.

B. J. A.

(2599) Fellers, C. R., "Effect of Processing on the Vitamin A (Carotene) Content of Foods." Proc. Inst. of Food Tech. 1940, 97-107. - Carotene is decreased in green leafy vegetables by drying out and wilting. Cool, moist storage prevents loss, and in the storage of quick-frozen vegetables, the losses are negligible. This vitamin loss is roughly proportionate to temperature. That both carotene and vitamin A are relatively stable to heat and cold are borne out by considerable experimental work. The manipulations involved in the preservation of foods by canning and freezing have little effect on vitamin A. Aeration, sun-drying, and high-temperature storage are distinctly harmful to vitamin content.

Author's Summary.

(2600) Fenton, F., "Unknown Factors Upset Precooked Foods Quality Control." Food Freezing 1, 163-5, 188-89 (1946). - A list of more than 100 precooked and frozen soups, meats, poultry, sauces, prepared dishes, fish, and baked goods is given. The storage life of these foods is limited to 4 weeks for some, to more than a year for others. Failure to maintain sufficiently low temperature in the plant, in transit, in sales room, or in the home will ruin any of these products. Lack of proper sanitation ruins many meat products, and lack of proper procedure after they reach the consumer spoils others.

R. A. 1, 153 (1946).

(2601) Fenton, F. and Fitzgerald, G. A., "Frozen Cooked Foods." Refrig. Eng. 53, No. 2, 107-11 (1947); Frozen Food Ind. 3, No. 2, 24-5, 45-7 (1947) - Studies were carried out on yeast rolls, pies, and ice cream to aid the development of directions for obtaining high quality frozen cooked products in home kitchens. Foods were frozen at -20° F. and stored at 0° F. in a home freezer. A panel of 6-10 experienced judges taste-tasted the foods prepared by standard methods. Frozen baked rolls were preferred to frozen unbaked rolls, but both were acceptable. Pies baked before freezing were not as high in quality as those baked after freezing. The quality of the ice cream was affected by the mix, method of freezing, rate of freezing, and batch quantity. After 3 weeks' storage, all ice creams tended to lose their flavor slightly and to shrink. Discussion included.

R. A. 2, 105-06 (1947).

(2602) Ferguson, F. P., "Mixed Frozen Fruit Promising Product." Quick Frozen Foods 8, No. 7, 20 (1946). - Fruits may be frozen in season, partially thawed later, and then refrozen into unusual, appetizing combinations. It may be used as a "frozen fruit cocktail", or as fresh fruit dessert.
B. J. A.

(2603) Ferguson, F. P., "Freeze Uncooked Strawberry Jam." Quick Frozen Foods 8, No. 9, 183 (1946). - Uncooked strawberry preserves may be frozen and held for use in ice cream or as a garnish on sundaes.
B. J. A.

(2604) Fieger, E. A., et al., "Freezing Experiments on Strawberries." Food Ind. 18, No. 9, 1466 (1946). - Physical, chemical, and organoleptic examinations were made of a wide variety of samples from various methods of preparing and freezing strawberries. Slicing facilitated absorption of sugar, resulting in retention of more flavor; dry sugar gave a much better product than did sirup; added sugar had no effect on color of strawberries; and delay in freezing resulted in an inferior product. The best proportion of sugar to berries was between 1:4 and 1:5, depending on personal preference.
R. A. 1, 207 (1946).

(2605) Fieger, E. A. and DuBois, C. W., "Conditions Affecting Quality of Frozen Shrimp." Refrig. Eng. 52, No. 9, 225-8 (1946). - Methods of fishing and handling Gulf shrimp were studied in a laboratory aboard a shrimp boat. Frozen shrimp of the highest quality is obtained by preparing and freezing immediately after catching. The alternative is to behead the shrimp, cool quickly to 32-35° F. by icing, and store at 32° F. until processed. Large losses of moisture can occur from green or headed shrimp through the use of containers with low moisture vapor resistance.
R. A. 2, 36 (1947).

(2606) Filinger, G. A. Products for the Frozen Food Locker. Kans. Engin. Expt. Sta. Bull. No. 47, 1946. Pages 50-2.

(2607) Finnegan, W. J., "(Quick) Freezing of Fruit Juices in Cans." Fruit Prod. J. 20, 141-43, 146 (1941). - Plant and procedure are described.
Br. A. BIII, 182 (1941).

(2608) Finnegan, W. J., "Methods of Improving Food Freezing Operations." Food Pkr. 28, No. 3, 158-61; Ice & Refrig. 112, No. 2,53-6 (1947). - For flexibility and efficiency, process should be continuous and equipment interchangeable. Miscellaneous heat losses should not exceed 10% of heat removed from commodity. Compressors should be operated at highest practical suction pressures. Two-stage freezing is efficient because 80% of the refrigeration is accomplished at 14° F. and 20% at -10° F. This eliminates the need for multistage or booster compressors, saves power, reduces cost of equipment, and results in less desiccation of the product. Desiccation is influenced by air temperature rise over the product, mean temperature difference between primary refrigerant and air, partial vapor pressure differential between air and food, ratio of exposed surface of food to volume, and length of freezing period. Loose frozen foods may lose 5.5-12% in weight during freezing.
R. A. 2, 193 (1947).

(2609) Fischer, H. and Staub, M., "The Freezing of Milk in Brine Coolers as the Cause of Watering." Schweiz. Zentralbl. Milchwirtschaft 34, 61, (1945). - When milk in a dairy is cooled in a brine surface cooler to a low temperature, a film of ice is formed on the ridges. If the whole ice film is thawed at once, the fluid contains more water than normal milk; it should be returned to the whole volume of milk and not sold separately as milk. In 3 cases where this "milk ice" was sold as milk, there was an apparent dilution of 20 to 30 per cent.

N. A. R. 15, 32 (1945).

(2610) Fisher, D. F., "Supervision Determines Quality in Frozen Foods." Frosted Food Field 2, No. 2, 24 (1946). - High quality in frozen foods must not be overlooked amid the increasing activity in the merchandising of these foods.

M. B.

(2611) Fisher, R. M., "What Does the Wholesale Grocer Think about Frozen Foods?" Food Freezing 2, 187-88; Wholesale Grocer News 21, No. 11, 51-4, 56 (1947).

(2612) Fiske, D. L., "Army's Frozen Meat Program Points Way to Peacetime Use." Food Freezing 1, 88-91, 109 (1946). - The U. S. Army has developed procedures for supplying field forces with convenient size portions of the best quality frozen boneless beef shipped in solid fiberboard 50-lb. cartons. Adequate facilities for transportation in the quantities and at the low temperature required by the Army originally were not available. Storage warehouses were erected at strategic points, ocean shipping facilities expanded, and in addition, refrigerated semi-trailers, prefabricated refrigerated warehouses, and both walk-in and reach-in portable refrigerators were provided for handling the beef in advanced and combat areas. As a result of war experience, standard cuts of meat, boneless and frozen, in attractive packages, eventually will be marketed for civilian use.

R. A. 1, 154 (1946).

(2613) Fitzgerald, G. A., "A Look at the Future of Quick Frozen Foods." Quick Frozen Foods 6, No. 5, 22 (1943). - Methods of freezing, in the broad sense, will include the cooling of produce, such as beans, as soon as they are picked in the field, as well as the use of freezing lockers on the farm. Future frozen food markets will probably offer frozen cooked vegetables and meats as well as frozen raw products. The quality of wrappers, bags, cartons, and overwraps used to package frozen foods must be carefully checked, and present trends toward package cheapening deserves a warning.

M. B.

(2614) Fitzgerald, G. A., "Precooked Frozen Foods--the Problem Child." Food Freezing 1, No. 1, 24, 32 (1945). - Precooked frozen foods were developed largely during the war, but will likely remain. The chief problems are sanitation, control of physiochemical changes, and keeping the operating costs low. Much research needs to be done on them yet.

R. A. 1, 91 (1946).

(2615) Fitzgerald, G. A., "Quality Grades Are Essential for Frozen Food Packs." Food Indust. 18, No. 6, 874-6 (1946). - Frozen food quality can

be maintained only if suitable standards are adopted by entire industry for raw produce and finished product; present conditions compel distributors to exercise quality supervision.

E. I. 1946, 433.

(2616) Fitzgerald, G. A., "How to Control the Quality of Frozen Cooked Foods; Raw Materials, Processing, Sanitation, Distribution, and Marketing." Food Indust. 19, No. 5, 623-25, 730-34 (1947). - A quality control program for frozen cooked foods entails controlling the quality of raw materials, the quality of foods during processing, adequate plant sanitation, and during distribution, marketing, and consumer handling. The complexity of the problem arises in that specific products must be considered separately. Emphasis is placed on the cooperation of the quality control, production, and engineering departments in setting up suitable sanitation standards, with measures for bacterial plate counts. Limits are proposed for E. coliform, bacteria index, and total bacteria count in raw and processed materials.

A. S. C.

(2617) Florea, R. S., "Frozen Fryers." Household 47, No. 3, 43 (1947).

(2618) Fournier, A., "On the Freezing of Milk." Rev. de Path. Compar. 41, 155-164, 183-85 (1941).

(2619) Franz, C. B., "Trend is Toward More Eviscerated Poultry." U. S. Egg & Poultry Mag. 51, 475 (1945).

(2620) Frost, P. J. and Carter, N. M., "Complete Freezing of Fish Flesh." Progr. Rept. Fish Res. Bd., Canada, Pacific Sta. 62, 21-23 (1945). - Experiments designed to ascertain at what temperature the freezing of flesh of some commercial Pacific Coast fishes is actually complete are described. Using a Dilatometer, it has been shown that with flounder flesh 80% of the liquid frozen at -30° F. was already ice by the time the temperature had dropped from 32° to 23° F., and approximately 95% had frozen out at 0° F., freezing still taking place slightly at -30° F., the lowest temperature reached. The most rapid formation of ice crystals appeared to occur between the beginning of freezing and approximately 25° F. Since denaturation appears to take place chiefly when the protein is in contact with or dissolved in some liquid naturally present in the flesh, these results show the necessity for sharp freezing and the storage of the fish at the lowest feasible temperature.

Br. A. BIII, 189-90 (Sept., 1945).

(2621) Cane, R., "The Concentration of Coffee Extracts by Freezing." Food Mfr. 21, No. 12, 519-24 (1946). - Description is given of experiments on preparation of extracts of coffee and their concentration by freezing and centrifuging. Extracts containing 15-18% total solids were concentrated by freezing at -6° C. and -10° C. (21.2 and 14° F.). The concentrated liquids, containing 27-35% total solids, were separated from the ice by centrifuging. More complete recovery was attained by centrifuging the ice while in a slightly thawed conditicn. Charts are given showing densities, freezing points, and refractive indexes for concentrations of 0-44% total solids.
R. A. 2, 96 (1947).

(2622) Garnier, A., "The Distribution of Frozen Products; a Visit to a Refrigerated Warehouse Assuring the Delivery of Frozen Products in a large American City and its Suburbs." Rev. Prat. du Froid 2, No. 4-5, 24-6 (1947).

(2623) Gault, W. C., "New Fields Awaiting (Frozen Foods) Processors." Quick Frozen Foods 9, No. 6, 66, 110 (1947).

(2624) Gavrilova, C., "Giant Stride for Birdseye-Snider." Canner 104, No. 6, 14-6, 26 (1947). - The frozen foods industry.

(2625) Gessner, A. L. Cooperative Possibilities in Freezing Fruits and Vegetables. U. S. D. A. Farm Cred. Adm. Misc. Rep. No. 84, 1945. 60 pages. - Fruit and vegetable co-operatives are interested in frozen foods as a method of distributing their products. Raw materials available, plant facilities and equipment for processing, methods of freezing, and distributing the products are phases of the problem which require study by prospective plants. Statistical and historical data are included to aid in such studies. A list of 25 selected references is also given.
R. A. 1, 215-6 (1946).

(2626) Gessner, A. L. Fruit and Vegetable Freezing Costs. Kansas City U. S. D. A. Farm Credit Admin. Coop. Res. and Serv. Div. Misc. Rpt. No. 91, 1945. 38 pages. - Preliminary report.

(2627) Gibson, E. T., "Quality Control--Key to the Future of Frozen Foods." Canning Trade 68, No. 31, 64-6 ; West. Frozen Foods 7, No. 5, 3-5 (1946).

(2628) Gibson, E. T., "Where do We Go from Here with Frozen Foods?" Food Indust. 18, No. 4, 528-29 (1946). - With years of early development safely past, industry must safeguard itself against opportunist and incompetent; from now on, quality will be measure of difference between profit and bankruptcy. Condensed from talk before National Frozen Food Packers Association.
E. I. 1946, 964.

(2629) Gilb, H. W., "Electronic Defrosting of Frozen Foods." Food in Canada 5, No. 8, 9-10 (1945). - High frequency heat reduces the time required for defrosting frozen food, reduces the amount of defrosting area required, and yields a product with the firmness and texture of the tree-matured fruit or vine-ripened berries, an achievement impossible under normal thawing processes. Food spoilage is also reduced. The food is best moved on a belt conveyor through the defrosting area.

B. A. 20, 710 (1947).

(2630) Gilkerson, Y., "New Locker Plant at Greer, S. C., is Forced to Enlarge Quickly." South. Refrig. J. 1, No. 5, 16 (1946).

(2631) Gilligan, G. M. and Woodmansee, C. W. Factors in the Destruction of Ascorbic Acid and Carotene in Kale. Univ. Delaware Agric. Exp. Sta. National Coop. Project Pamphlet No. 16, 1945.

(2632) Given, M., "The Best Way to Freeze Sliced Strawberries." Better Homes & Gard. 25, No. 9, 95-6 (1947). - Strawberries picked for freezing should be ripe, of fine texture, and of full flavor; gathered early in the morning while still cool; washed quickly and carefully; sliced directly into the freezing container and sugared; sealed into the container; and frozen.

M. B.

(2633) Gleeson, M., "Northern California Frigid Dough Co. Plans to Double Production Shortly; Find Dealers Short on Facilities but Eager to Sell Frozen Baked Foods." Bakers Weekly 134, 59-60 (1947).

(2634) Glennie, A. E. and Keuneman, J. L. H. Index to the Literature of Food Investigation, Vol. 16, No. 1, June 1944. Fourth Edition. Wash., D. C., Brit. Commonwealth Scientific Office, 1945. 77 pages. - This publication contains abstracts of the literature on food preservation issued 1939 1943.

B. S. I. R. 4, 680 (1947).

(2635) Gockley, R. R., "The Best Method of Handling and Use of Frozen Cream." Proc. Int. Assoc. Ice Cream Mfgrs. 2, 68 (1936).

(2636) Golsan, Page E., Jr., "The (Home) Food Freezer as a (new Electric) Load Builder." Elec. World. 123, No. 5, 128, 130 (1945).

(2637) Gore, H. C., "Preparation of Liquid Food Concentrates in the Modern Household Refrigerator." Fruit Prod. J. 26, No. 1, 150, 157 (1947). - Orange juice with a Brix reading of 11.0° was concentrated to 18.6° by freezing and to 27.4° by refreezing in a modern household refrigerator ice cube compartment. The remaining solution had a Brix reading of 10.4°. After freezing, the cubes were crushed and allowed to drain or the concentrate was pressed out. The operation may be repeated as many times as desired with a gradual increase in the concentration of the juice.

R. A. 2, 99 (1947).

(2638) Graham, J. Freezing Fruits and Vegetables. Iowa State Col. Agr. Ext. Pamph. No. 113, 1946. 20 pages.

(2639) Grant, H. B., "Frosted Foods More than an Ice Cream Sideline." Ice Cream Field 47, No. 3, 12, 16, 62; Natl. Food Distrib. J. 19, No. 3, 35-6 (1946). - In the business field, frozen foods are closely akin to ice cream, and the two types of products will be prepared by ice cream firms more and more in the future.

M. B.

(2640) Graul, L. S. and Lowe, B., "How Storage Affects Frozen Cakes and Batters." Food Indus. 19, No. 3, 330-32 (1947). - Cake batters and cakes made with hydrogenated lard and with butter were frozen in pans on a single refrigerated metal plate at -35° F. Weight losses of frozen cakes were negligible up to 2 months in 0 and -10° F. storages; 0.5 g. or less up to 4 months; 1.5-2.4 g. up to 8 months. Higher weight losses occurred in frozen batters, particularly during the first 6 months' storage. After 6 months, the batters had hard round dots, light in color, on the surface; after 8 months, the entire surface was hard. The yellow color of batters made with hydrogenated lard became deeper when stored at 0° F. for 2 months, but did not increase with longer storage and did not appear at -10° F. storage. Synthetic vanilla flavoring in batter changed its color from yellow to a grayish white with a pink tinge. All cakes or cakes from batters stored at 0° F., with 1 exception, had smaller mean volumes than similar cakes stored at -10° F. Cakes baked from batters held for 2 months at -10° F. had volumes and textures similar to those of the freshly made cakes. Longer storage resulted in decreased volume and a more compact cake with an increasingly heavy layer at the bottom. With the exception of a gummy top crust, cakes baked before freezing were similar in appearance to fresh cakes even after 8 months' storage. No significant difference in palatability was noted among the fresh cakes, frozen cakes, or cakes made from batters stored at -10° F. At 0° F., however, a change in flavor was evident after 2 months' storage. Cakes baked from batter to which synthetic vanilla had been added were unpalatable after storage at either -10° or 0° F. for 6 months.

R. A. 2, 191 (1947).

(2641) Grayson, R. V., "Frozen Fruits for Wine and Brandy Manufacture." Ice & Refrig. 90, No. 1, 71-3 (1936). - For brandy manufacture, no sugar can be added to the fruit pulp which is to be frozen. Some sugar can be used with fruits intended for wine fermentation, about 35 gallons of wine being produced from a 50-gallon barrel of frozen pulped peaches, and from this residue 3 gallons of 100 proof brandy can be distilled. The size of the wine and brandy industry being so great, they can readily use 40 per cent of the present frozen fruit pack.

B. J. A.

(2642) Grayson, R. V., "New Aspects of the Shrimp Industry." Fishing Gazette 57, No. 8, 40, 50 (1940).

(2643) Greaves, V. D. and Joslyn, M. A. Nutrition Program; Freezing Storage, Home Preparation for Freezing Storage, and Use of Certain Frozen Products. Calif. Agr. Col. Ext. H. D. No. 473, revised, 1945. 6 pages.

(2644) Greene V. R. H., "Some Thoughts on the Future Developments in Locker Plants." Ice Cream Field 45, No. 1, 30, 32 (1945). - Possibilities in semi-portable locker plants for apartment houses, super markets, and ice cream plants are discussed. Design for a small locker plant with exterior access to individual lockers is given.

R. A. 1, 98 (1946).

(2645) Greeson, A., "Frozen Seafood." Quick Frozen Foods 8, No. 9, 22 (1946).

(2646) Greeson, A., "Three Factors Determine the (Frozen Food) Distributor's Future." Quick Frozen Foods 9, No. 9, 66 (1947).

(2647) Griffiths, E. and Hickman, M. J., "Tests on Equipment Designed for the Refrigerated Storage and Transport of Meat in the Tropics." Inst. Refrig. Proc. 42, 97-110, 125-7 (Feb. 28, 1946). - Techniques used in tests on equipment for storage and transport of perishable foodstuffs under simulated tropical conditions are reported. The equipment included a mobile refrigerating plant, a transportable cold store, a freezer unit, and various types of containers suitable for transport by road, rail, ship, or aircraft.

R. A. 2, 45 (1947).

(2648) Griswold, R. M. and Blakeslee, L. H., "The Effect of Different Wrappings, Temperature, and Length of Storage on Keeping Quality of Frozen Pork Chops." 32nd Ann. Meeting Am. Soc. Animal Production, 305-14 (1939). - Palatability and shrinkage of pork chops wrapped in 7 different materials and held at 0°, 5°, and 15° F. have been studied. No change in palatability was noted in testing. But wrappers had great effect on moisture loss; Kraft wrapping paper permitted greatest loss, whalehide the next, Thermo M, lard, and lard-tallow moderate amounts, and cellophane least moisture loss of all. Palatability decreased and shrinkage increased as storage time lengthened, the fat of some becoming rancid after 180 days' storage.

B. J. A.

(2649) Gubser, R., "Keeping Forty-year-old Cold Storage Plant Modernized." Refrig. Eng. 50, No. 5, 425-26 (1945). - Description of successive improvements made to two plants of Los Angeles Ice and Cold Storage Company to keep them efficient and in line with continual progress made in refrigeration; although originally each building was refrigerated by absorption, they have both been converted to direct expansion; one plant is entirely devoted to sharp freezer storage. Before American Society Refrigerating Engineers.

E. I. 1946, 231.

(2650) Gubser, R., "Air Blast Quick Freezing." Refrig. Eng. 53, No. 1, 23 (1947). - A brief review of air blast freezing systems.

R. A. 2, 114 (1947).

(2651) Guckenberger, A. F., "Are Retailers Divorcing Frozen Foods?" Quick Frozen Foods 9, No. 7, 68, 88, 92 (1947); South. Calif. Grocers' J. 34,

No. 2, 14-5, 23 (1947). - In order to assure continued retail and consumer interest in frozen foods, quality must remain high and yet selling prices be competitive. Advertising and promotion of sales must be increased in order to keep grocers interested in stocking frozen foods which will sell well.

B. J. A.

(2652) Juggedahl, A., "Frozen Food Locker Plants in Iowa." Iowa Yrbk. Agr. 45, 61-3 (1945); Iowa Dept. of Agr., Dairy & Food Div., Annual Report 58, 48-50 (1944).

(2653) Gumm, Marcelle K., "Frozen Foods Preferences in the Army." Quick Frozen Foods 9, No. 5 76-7 (1946). - Frozen spinach, broccoli, chicken a la king, beef and veal stews, turkey a la king, and beef patties were well received but squash, cauliflower, and mixed vegetables were never very popular.

R. A. 2, 109 (1947).

(2654) Gwin, J. M., "How the Army Looks at Frozen Foods." Quick Frozen Foods 4, No. 7, 26-9; No. 8, 25-6, 32 (1942).

(2655) Hagen, R.M., "Warehouse Servicing of Frozen Foods." Frozen Foods Ind. 2, No. 4, 24, 55-56 (1946).

(2656) Hagen, R.M., "Cold Storage Servicing of Frozen Foods." Ice & Refrig. 111, 41-2 (1946). - Future trends with reference to storage of frozen foods in public cold storage warehouses discussed; classes of service; clarification of temperatures. Before Association of Refrigerated Warehouses, Chicago.

E. I. 1946, 231

(2657) Hall, E.G., "Preservation of Fruits and Vegetables by Quick Freezing." J. Austral. Inst. Agric. Sci. 16, No. 9, 75, 137-9 (1944). - The development of the quick-freezing industry in U.S.A. is reviewed.

Br. A. BIII, 63 (Mar., 1945)

(2658) Hall, J.E., "Does your Label Inform or Confuse the Frozen Food Buyer." Food Freezing 2, No. 7, 478-9, 510-11 (1947). - An informative labeling program for frozen foods is being undertaken by the National Association of Frozen Food Packers. Advertising can only call a product to the attention of the consumer. It is a part of a good selling plan to give also the important facts about the product in simple, self-interpreting, standardized words. Information should also be given on how to handle, prepare, and cook these foods, and include standard serving suggestions with alternative serving suggestions for preparing combination dishes with frozen fruits and vegetables.

A. S. C.

(2659) Hall, J.E., "Technical Problems Facing the Frozen Foods Industry." West. Canner and Packer 39, No. 1, 78-79 (1947). - The fact is stressed that adequate operating data must be kept and utilized by research workers in industry to bring frozen food packs up to the highest standards possible.

B. J. A.

(2660) Haller, E. M., "Railroads Experiment with new Cars for Frozen Foods." West. Frozen Foods 7, No. 10, 5 (1946).

R. A. 2, 46 (1947).

(2661) Handley, R.D., "Some Suggestions on How to Package Frozen Meats." West. Canner & Packer 39, No. 2, 69 (1947) - Visibility is an important factor to consider in packaging frozen meats. When using transparent film, a tight wrapping job is essential for 2 reasons: the inner surface of the film may fog and ice crystals form, thus impairing transparency; and, these same voids may provide space for moisture accumulation, thus permitting the meat to dehydrate slightly. Odd-shaped cuts of meat should be hand packaged. If the meat contains bones, a heavier weight cellophane is best, to use to make sure the bones do not pierce the wrapper.

B. J. A.

(2662) Hargrave, P.D. and Hogg, N.J., "Frozen Foods in Relation to Varietal Adaptability. 1. Corn, Peppers, and Tomatoes." West. Canad. Soc. Hort. Rpt. Proc. 2, 41-48 (1945).

(2663) Harrell, D. N., "Freezer Locker Industry Shows Rapid Growth (Georgia)." So. Refrig. J. 1, No. 8, 3, 10, 18 (1946).

(2664) Harrison, E. W., "Frozen Food Locker Plants." Modern Refrig. 49, No. 576, 57-8, 70 (1946). - Brief review of development of frozen food locker plant in United States; present position in Great Britain; description of modern locker plant, together with diagrammatic layout, presented.
E. I. 1946, 231

(2665) Hart, F. L., "(Analysis of) Frozen Desserts (Ice Cream)." J. Assoc. Off. Agric. Chem. 24, 575-7 (1941) - Since lactose and glucose become anhydrous at 110°C. and 146°C., respectively, drying conditions must be specified. The residue obtained after heating the sample (1-2 g.) for 4 hours in a vacuum oven at 100°C. should be reported as "total solids".
Br. A. BIII, 25(Jan., 1942).

(2666) Hart, L., "Frozen Foods are new Co-op Aid to Consumer." Cooperator 9, No. 21, 1, 2 (1946). - Sale of frozen foods by cooperatives.

(2667) Havighorst, C. R., "Shrimp Deveined and Frozen." Food Indust. 17, No. 11, 1314-15 (1945). - Jumbo shrimp from Gulf of Mexico are deveined by ingenious machine and frozen in modern plant of Colter Company to help meet growing demand for seafood; in off-season periods, eggs are frozen to keep plant busy; machinery and methods used are illustrated and described.
E. I. 1946, 964

(2668) Havighorst, C. R. and Diehl, H. C., "Frozen Food Report No. 2; I. Transportation." Food Ind. 19, No. 1, 7-17 (1947) - Recorded temperature data are given for transcontinental shipping tests conducted by Pacific Fruit Express Co, USDA, and Association of American Railroads in which cars of various types were used. Although 0°F. is desirable for most frozen foods, there are as yet no cars that will consistently hold loads below 10-15°F. on a normal transcontinental trip. In general, frozen food shippers require heavily insulated cars and prefer the overhead bunker type, but cars equipped with fans have given practically equal results. End bunker cars have failed to hold desired temperature in the top part of the load. Fan cars with only 3-3.5 in. of insulation have maintained satisfactory temperature while in motion; but during time train is stationary and fans are not operating, loads warm up. No air freight companies are operating refrigerated planes that offer safe transportation for frozen foods. Refrigerated trucks and trailers are major factors in distributing frozen food but as yet are not utilized in transcontinental shipments because of limitations in structural features and problems of interstate license and control. Refrigerated ships are being built with facilities for frozen food storage, but major problems of design and operation remain to be solved before this mode of transportation can be utilized extensively.
R. A. 2, 116 (1947).

(2669) Havighorst, C. R. and Diehl, H. C., "Frozen Food Report No. 2; II. Warehousing." Food Ind. 19, No. 1, 18-26 (1947). - Reliable and sufficient cold storage warehousing is a very important factor in the quality retention of frozen foods. Facilities include private storage at packing plants, private storage at distribution points, and public storage. A comprehensive study of all factors must be made with minimum cost as the ultimate goal before sound expansion of warehousing can keep pace with the expanding frozen food industry. Report includes data for U.S. on (1) frozen foods production, (2) fruit and vegetable pack in storage when subsequent year's pack began. and (3) expansion of freezer storage space in public storages.

R. A. 2, 116-17 (1947).

(2670) Havighorst, C. R. and Diehl, H. C., "Frozen Food Report No. 2; III. Frozen Food Distributional Facilities of the United States." Food Ind. 19, No. 1, 27-8 (1947) - Public, semipublic, and private refrigerated storage facilities in the US are located by states on a map.

R. A. 2, 117 (1947).

(2671) Havighorst, C. R. and Diehl, H. C., "Frozen Food Report No. 2; IV. Marketing. V. Frozen Food Marketing Areas of the United States." Food Ind. 19, No. 2, 149-62 (1947) - IV. The problems of frozen food marketing, market analyses, and the importance of locker plants in rural markets are discussed on the basis of a recent industry-wide survey. Marketing is the most formidable problem facing the industry. V. The relative value of individual marketing areas is shown by a map.

R. A. 2, 117 (1947).

(2672) Havighorst, C. R., "Frozen Food Trends in Production, Distribution, and Marketing." Fruit Prod. J. & Amer. Food Mfr. 26, 238-239 (1947).

(2673) Haw, J. W., "The Pacific Northwest is a Natural for Frozen Foods." Quick Frozen Foods 9, 78-79 (1946). - The rapid development and expansion of the frozen food industry in the Pacific Northwest is discussed. The research being done, variety of the pack, growing conditions, and transportation facilities are also stressed.

B. J. A.

(2674) Hawk, C. V., "Refrigerating Requirements Aboard U. S. Naval Vessels." Refrig. Eng. 53, No. 3, 200-2, 254-6 (1947). - Refrigeration is applied to ship's stores, air conditioning, reach-in refrigerators, frozen food cabinets, drinking water coolers, process water coolers, X-ray equipment, soda fountains, ice cream makers, and hardening cabinets. Ship's stores meat rooms are designed for 15°F.; dairy rooms for 32°F; fruit and vegetable rooms for 40°F.; and in new construction, frozen food spaces at 0°F. A spare compressor-condenser unit is required for all installations. Compressors are adaptations of commercial units suitable for Naval service. Condensers which use sea water require copper-nickel tubes and tube sheets, brass shells, and cast bronze heads. The water velocity is limited to 6.5 ft-lb/sec. Brass receivers large enough to hold greater part of refrigerant charge are required. Low sides consist of copper tubing located on bulkheads and fans to keep air circulating in the stores. Fully automatic controls including thermostatically operated solenoid valves in each liquid line and back pressure regulators where one compressor serves rooms held at different temperatures are used.

R. A. 2, 118 (1947).

(2675) Hayes, Norman V., et al., "Problems in the Dehydration of Orange Juice." Proc. Amer. Soc. Hort. Sci. 47, 123-9 (1946). - Dehydration of orange juice to a virtually anhydrous powder, using a vacuum diffusion process, gave a powder that keeps well with little loss of ascorbic acid and readily yields an extremely palatable juice when water is added. Stopping dehydration short of the powder state yields a concentrate that can be frozen. In addition to the pilot plant, the useful tools for drying an experimental concentrate are described and illustrated.

B. A. 21, 705 (1947)

(2676) Heck, M. C., The Economic Importance of Freezer Locker Plants in Arkansas. Arkansas Agr. Col. Ext., Ark. Agr. Ext. Econ. Series, 1947. 1 page.

(2677) Heerdt, M., Jr., "Wrapping Materials for Frozen Fish." Com. Fisheries. R. 8, No. 9, 6 (1946); Food Packer 27, No. 13, 42 (1946). - Atmospheric oxygen causes loss of fresh flavor, the development of rancidity, fading of natural color, and development of unnatural odors in fish. Ordinary moisture-vapor proof wrapping materials do not prevent the entrance of oxygen, but fish vacuum-packed in tin containers is adequately protected.

R. A. 2, 105 (1947)

(2678) Heerdt, M., Bucher, D. L., and Stansby, M. E., "Refrigerated Locker Storage of Fish for Home Use. I-II." West. Frozen Foods 7, No. 9, 3-6; No. 10, 6-8 (1946). - The essential factors for successful locker storage of fish for home use include (1) procurement of suitable raw material, (2) selection of suitable locker plant freezing and storage facilities, (3) proper methods of preparation including freezing, glazing, and packaging, and (4) storage at proper temperature. The preparation for locker storage of fresh shellfish, oysters, scallops, and clams is discussed, as well as precooked frozen fish products.

R. A. 2, 43 (1947)

(2679) Heerdt, M., Jr., Fish Can Be Stored in Refrigerated Lockers with other Foods. U. S. D. I. Fish & Wildlife Serv., Fishery Leaf No. 181. (Wim.), 1946. 3 pages. - Fish are seldom the source of foreign odors or flavors which develop in vegetables, dairy products, or meats stored in the same freezers with them. They are generally due to changes within the products themselves.

R. A. 1, 209 (1946)

(2680) Heid, J. L. and Beisel, C. G., "Citrus Products Technology, I-II." Food Pkr. 27, No. 11, 58-62; No. 12, 56-58 (1946). - The citrus products discussed included juices, frozen juices, dehydrated juices, concentrated juices, frozen concentrated juices, citric acid, pectin, marmalades, canned grapefruit segments, essential oils, alcohol, feed yeast, dried pulp, and sirup. High velocity, turbulent flow pasteurizers permit use of temperatures up to 240° F. with less modification of flavor than occurred during kettle heating at 170° F. Frozen concentrated orange juices stored in gastight containers and held at a uniform temperature of 0° F. or less retain their flavor and food value for as long as 5 years.

R. A. 2, 98-9 (1947)

(2681) Heiss, R., "Principles of Refrigeration of Foodstuffs." Chem.-Ztg. 66, 498-500 (1942). - The changes that occur during refrigeration are

predominantly chemical and largely enzymatic in nature. Storage of fish, meat, fruit, and vegetables for periods up to 1 year should be effected at -15° C. to -18° C. in order to minimize enzymatic changes.
Br. A. BIII, 106 (May, 1945).

(2682) Heller, W., "Research Reveals how Meat Shrinks." Food Ind. 14, No. 2, 50-3 (1942).

(2683) Hening, J. C., "Using Frozen Cherries in Cherry Ice Cream." Ice Cream Trade J. 31, No. 11, 16 (1935).

(2684) Hertel, N. and Bergh, F., "Frozen Food Locker Plants." Dansk Teknisk Tidsskrift 70, 85-95 (1946). - A survey of American practice in locker plant construction and proposals for adapting these methods to the conditions in Denmark in order to obtain the best and most useful plants.
R. A. 2, 200 (1947).

(2685) Hicks, C. G., "Package Planning--Nerve Center of Merchandising." Frosted Food Field 4, No. 4, 15, 19 (1947).

(2686) Higbee, V. B. and Christopher, E. P., Frozen Foods. R. I. State Col. Ext. Bulletin No. 95, 1945. 12 pages. - Varieties of fruits and vegetables are recommended for freezing at home. Directions for the preparation and freezing, also subsequent cooking, are given.
B. J. A.

(2687) Hilbert, G. E. and Pavcek, P. L., Kalttechnisches Inst. U. Technische Hochschule und Reichsanstalt für Lebensmittel Frischhaltung, Karlsruhe. FIAT Evaluation Rept. No. 1168; FIAT Final Rept. No. 219; Off. Pub. Bd., Report, PB 22457, 1945. 3 pages. - As director of both institutions, Dr. Plank had a total of 25 to 30 men working on problems related to the freezing of foods. Research work under Dr. Plank included the following: freezing of fruits and vegetables to obtain high quality products; experiments with immersion type freezing using brine and sugar solutions; use of dextrose and dextrine (obtained from potato starch) to increase nutritive (caloric) value of fruits without excessive sweetness; studies on the respiration of potatoes as effected by maturity and storage; and studies on vapor pressures of new refrigerants. Most of Dr. Plank's work on freezing preservation was carried out in collaboration with industry, but were not translated to an industrial scale. Most of the research information developed by Dr. Plank within the last few years has not been published. Use of high molecular weight dextrine for the freezing preservation of fruits is a new development with which American industry apparently is not familiar according to the report. It is known in Germany as Kapillaer syrup, and is prepared by the mild hydrolysis of potato starch and is a viscous, colorless syrup, neutral in flavor, produced by Kuestrin-Neustadt Kartoffelmehl- und Staerke Fabrik. The most important advantage of Kapillaer syrup is that, because of favorable osmotic pressure relations, its use reduces bleeding and disruption of plant cells to a minimum. For the Army, Dr. Rudolf Heiss in Munich was head of the Institut für Lebensmittelfrischhaltung. The main work of the Institute was concerned with bread preservation. The publications of Dr. Heiss on this general subject are summarized in a book, Vorratstechnik von Lebensmitteln, Theo. Steinkopff Verlag.

Several other names are mentioned in connection with research on food chemistry and preservation as well as studies in Russia, on freezing eggs, and a Russian publication on cold technology by Tuchscheidt (2d ed., 1939).
B. S. I. R. 2, 183 (1946).

(2688) Hilby, M., "The Place of Packaged Meats, Fresh and Frozen." Butcher's Advocate 118, No. 20, 11-12 (1945).

(2689) Hilder, H., "Importance of Temperature Control in Locker Plants." Quick Frozen Foods 9, No. 5,122-3, 142 (1946). - Storage temperatures affect spoilage, freezer burns and aging of meats. Chill and age rooms should be held at 33-34°F.; sharp freezers at -15 to -20°F.; curing rooms at 38-40°F.; locker rooms at 0°F. Cured meat should be stored at a constant temperature of 50-60°F.
R. A. 2, 115 (1947)

(2690) Hill, G. S., "Home Freezer Design and Moisture Problems." Refrig. Eng. 51, No. 5, 418, 448 (1946). - Two considerations in particular make design of home freezers different from that of fresh food refrigerators, temperatures maintained below change of state cause moisture problems in freezer which are not found in higher temperature cabinet, and temperatures must be maintained evenly throughout storage space of freezer.
E. I. 1946, 965

(2691) Hill, T. M., "Aluminum--Its Future in Frozen Foods." Quick Frozen Foods 8, No. 11, 86-87, 94 (1946). - Aluminum foil, now available to the frozen foods industry, has at least 9 properties of value in packaging: (1) protection, (2) odor proofness, (3) gas proofness, (4) light proofness, (5) glitter, (6) lead folding, (7) dimensional stability, (8) aging characteristics, and (9) insect proofness. It retains its strength even at -120° F., and may be used in a variety of ways for packaging frozen foods.
B. J. A.

(2692) Hiner, R. L. and Hankins, O. G., "Effect of Temperature of Freezing on Histological Characteristics and Tendencies of Beef." J. Animal Sci. 5, 404 (1946).

(2693) Hiner, R. L., "Lard as a Protective Material for Meats." Quick Frozen Foods 8, No. 4, 1264 (1946). - Dipping frozen meat in melted lard was found satisfactory for protecting it against drying and loss of flavors for 36 weeks. Lard was superior to tallow in that there was less chipping. The use of lard was also superior to glazing with ice, as the latter evaporated within a few weeks. Meat coated with lard should be wrapped in paper to prevent lard from being lost by abrasion.
R. A. 1, 151-2 (1946).

(2694) Hiner, R. L. and Hankins, O. G., "Fiber Splitting Results in More Tender Beef." Quick Frozen Foods 8, No. 6, 115 (1946). - 1.5-inch cubes of beef were frozen at various temperatures for 24 hours and examined microscopically. At 18°F. (-7.8°C.), H_2O appeared to be drawn from the

fibers to form large ice masses, leaving the fibers in irregular groups. At -10°F. (-17.8°C.), ice crystals were formed in the fibers, causing splitting of the walls; this effect was greater as the temperature of freezing was reduced. Amount of drip on thawing was greatest in samples frozen at 18°F, and deoreased as the freezing temperature was lowered. Apparently H_2O from the large inter-fiber ice masses resulting from moderate freezing is not well reabsorbed. Increase in tenderness in samples frozen at 18° F. and -114° F. (-81.1° C.) was 9% and 28.5%, respectively.

B. A. 20, 1091 (1946).

(2695) Hiner, R. L. and Hankins, O. G., "Temperature of Freezing Affects Tenderness of Beef." Food Ind. 19, No. 8, 1078-81 (1947). Histological examinations of 1½ inch oubes of beef muscle frozen at + 18° F. in still air showed large irregular ice areas between bundles of fibers, but no intrafiber ice. Fibers in samples frozen at -114° F. contained many small intrafiber ice crystals and extensive splitting. Samples at 0, -10, and -40° F. were intermediate, with splitting ocourring first in samples frozen at 0° F. Examination after thawing confirmed these observations. Beef rounds were also frozen and showed same general pattern as that of oubes, with ice areas and intrafiber orystals becoming progressively smaller at 25 mm. intervals toward the center of the round at all temperatures. Smallest surface crystals were found at -114° F. Beef rounds frozen at + 18, 0, and -114° F. were tenderer than unfrozen mates, with those at 18° F. least tender and those at -114° F. most.

B. J. A.

(2696) Hirsch, M., "Drying and Freezing." Refrig. Eng. 51, No. 4, 331-4, 364, 366, 368 (1946). - Principles of drying and freezing analyzed; Pressure ratio; freezing point and pressure ratio; conventional manner of representation of equilibrium conditions; freezing curves; modified method representation; drying versus freezing; storage.

E. I. 1946, 431.

(2697) Hirsch, S. R., "Some Problems of Low Temperature Refrigeration." Refrig. Eng. 50, No. 3, 222-4, 244-5 (1945). - Practical discussion of various operating problems encountered in low temperature refrigeration applications not lower than -40° F; author states that recommendations made have been successfully applied and have worked. Before American Society of Refrigerating Engineers.

E. I. 1945, 920.

(2698) Hockman, R. O., "Problems in Packaging Meat Products." Nat. Provisioner 114, No. 16, 76-76D (1946). - Packaging material for fresh and for processed meats must be attractive, clean, transparent, and able to withstand storage temperatures. Packaging material must preserve color of fresh meats and prevent formation of off-odors and must absorb drip. The effect of intensity and color of light on fading of processed meats is discussed. Yellow light produced less fading than either ultraviolet or white fluorescent light. Dehydration of frozen meat is minimized by use of close fitting, moisture proof, and tightly sealed wrapping material. Off-flavors develop more quickly when aged meat is frozen than when meat is frozen immediately after being chilled. It is now possible to package fresh, processed, and frozen meats if trained personnel and adequate facilities are available.

R. A. 1, 157-58 (1946).

(2699) Hoey, J. J., "Fast Frozen Olives." Pacific Rural Press 142, 130-1 (1941).

(2700) Hoey, J. J., "New California Locker Plant an Architect's Dream." Ice and Refrig. 109, No. 2, 58, 60 (1945).

(2701) Hoffman, K. and Lowe, B. M., "Cooking Studies with Frozen Poultry." U. S. Egg & Poultry Mag. 45, 156-59, 212-14 (1939).

(2702) Hohl, L. A., "Preparation and Pretreatment of Fruits for Freezing." Food Freezing 1, No. 6, 287-90, 312-14 (1946). - Proper preparation of fruit for freezing is necessary to preserve color, flavor, and general quality. Pretreatments include 4 categories: (1) selection of suitable varieties; (2) exclusion of air by vacuum or gas pack; (3) use of antioxidants, including ascorbic acid and the sulfur treatments; and (4) blanching by the inactivation of enzymes with heat.

R. A. 1, 213 (1946).

(2703) Hohl, L. A. and Swanburg, J., "Freezing of California Fruits--Apricots." Food Packer 27, No. 4, 37-8, 68, 70, 72 (1946). - Commercial procedures and experimental studies on processing of apricots for freezing are described, and the following recommendations are made: (1) the best processing procedure depends upon the use to which the product is to be put, and the engineering of the processing plant, (2) if blanching is used, steam blanching for just long enough to inactivate the enzymes, followed by air cooling, was found to give good results, (3) if sulfurous acid treatment is chosen, dipping apricots into an SO_2 or Na bisulfite solution containing 4000 ppm. SO_2 for 4 minutes has given good results for fruit frozen in halves; the average SO_2 content of fruit treated in this way was 50 to 75 ppm., (4) ascorbic acid is a satisfactory antioxidant, if used properly; best results were obtained by using equal weights of fruit and 40° Brix syrup containing 0.1% ascorbic acid, (5) apricots packed in enough sugar syrup (40° Brix) to cover the fruit required a minimum of antioxidant to retain good color, and (6) crushed apricots intended for use in jams may be processed by blanching, or packed raw, with about 75 to 100 ppm. SO_2 or 200 ppm. ascorbic acid, if the fruit is used immediately after thawing is complete.

B. A. 20, 1482 (1946).

(2704) Hohl, L. A., "Freezing California Fruits--Figs." Food Packer 27, No. 11, 66-70 (1946). - On the basis of a series of experiments, the following recommendations may be made for freezing figs. The Black Mission is the best of the California varieties. Calimyrna has good flavor but skin is too thick and seeds prominent. Other varieties rate in order named--Kadota and Adriatic. Sliced figs covered with 35° Brix syrup were attractive for dessert use. Crushed figs mixed with sugar in the ratio of between 4 and 6 to 1 have kept their fresh flavor and color well during freezing storage. Rapid oxidation during thawing may be inhibited by the addition of 50 ppm. SO_2 to the crushed figs before freezing. Blanching before freezing prevents oxidation but imparts a cooked flavor and softens the tissue.

B. A. 21, 705 (1947).

(2705) Hohl, L. A., "California's Frozen Foods." Pacific Rural Press, South Ed. 151, 519 (1946).

(2706) Hohl, L. A., "Vitamin C Retention as an Index of Quality." Quick Frozen Foods 8, No. 11, 64-5, 114 (1946). - Vitamin C is recognized as one of the best indexes of quality because every factor which detracts from general quality also lessens the vitamin C content. For frozen vegetables these factors include variety, maturity, excess contact with water, blanching time, slow cooling, holding after blanching, storage temperature, cooking, and holding periods.

R. A. 2, 36-7 (1947).

(2707) Hohl, L. A., "Varietal Adaptability to Freezing of Several California Stone Fruits." Quick Frozen Foods 9, No. 9, V-VI (1947). Condensed in: Fruit Prod. J. 26, 245, 253 (1947); Air Cond. & Refrig. N. 51, No. 2, 24 (1947); Food Pkr. 28, No. 7, 36, 38 (1947). - Most peaches frozen commercially in California are freestone, yellow fleshed varieties such as J. H. Hale, Rio Oso Gem, and Elberta. Tioga, with good acid-sugar texture, balance, and appearance, yielded the most acceptable product but does not bear well. Lovell and Muir, clingstone varieties, were of poor quality when sliced and frozen but made excellent frozen puree. Gower was the best white fleshed variety, followed by Stanwick, New Boy, Humboldt, and Kim. The varieties of apricots frozen include Hemskirk, Royal, Moorpark, and Tilton.

R. A. 2, 179 (1947).

(2708) Hohl, L. A., "Strawberry Freezing in California." Quick Frozen Foods 9, No. 11, 76-7, 96 (1947). - Several new varieties of strawberries have been developed in recent years especially for use in the California freezing industry. Experiments were run with Shasta, Sierra, Donner, Lassen, and Tahoe varieties to determine their adaptability to freezing. Ideal qualities for strawberries for freezing include: pleasant, potent flavor, and acidity easily retainable; uniform deep bright red color, good size, and firm texture; good adaptability to growing conditions; disease resistant; and dependable producers. In order to cover the fruit in one pound containers and also keep the fruit to sugar ratio of 5:1, it was found that a 20° Brix sucrose solution met all conditions for whole berries, and for sliced berries a 40° Brix sirup or a dry sugar pack is recommended. Samples of each variety were quick frozen in an air blast at -20° F. and stored, tests being run after 3 and 9 months, each sample being scored for color, appearance, texture, flavor, and odor. Sierra and Shasta varieties ranked highest in these tests, but each of the others has varying degrees of merit.

B. J. A.

(2709) Holmes, A. D., et al., "Vitamin Content of Field-Frozen Kale." Amer. Jour. Dis. Children 70, No. 5, 298-300 (1945). - Kale is one of the few green leafy vegetables that survives early killing frosts; during the following month or two, fresh, growing kale is available for eating either raw or cooked, and frost greatly diminishes the characteristic flavor that is unpleasant to many people. Both mature and immature leaves of 18 samples that had been frozen at least 7 times in the field were assayed. The average values were water 78.1%, ascorbic acid 185.4 mg., carotene 6.0 mg., nicotinic acid 2.08 mg., and pantothenic acid 0.82 mg./hundred grams. Field-frozen kale can thus contribute essential nutrients to the human diet, especially when the supply of fresh green leafy vegetables is limited.

B. A. 20, 1322 (1946).

(2710) Holten, E., "Freezing of Meat." Sabroe Nyt. 23, No. 2, 3-10 (1945). - Description of the different methods of freezing meat.

R. A. 2, 31 (1947).

(2711) Hopkins, J. W., Steeves, T. A., and Cook, W. H., "Reduction of Spatial Temperature Variations in Air-cooled Storage Rooms. II." Can. J. Res., Sect. F. 24, No. 10, 380-95 (1946). - Measurements made under a series of imposed conditions of heat load, dunnage spacing, and air flow were in agreement with previous work in this laboratory in demonstrating (1) the occurrence of appreciable permanent temperature gradients in material, whether exothermic or endothermic, stacked in an air-cooled storage room, and (2) the possibility of markedly reducing these gradients by effective channeling of air through the stack. With end-to-end circulation, blocking of voids in the room was the most important single factor in minimizing intra-stack temperature differentials under the conditions of these tests. Further improvement was effected by the provision of optimum size dunnage, 3/8 - 1/2 inch, and by increasing the air flow from 290 cubic feet per minute to 1130 cubic feet per minute. It is inferred that with blocked voids, dunnage should be extended to all external surfaces of the stack. The desirability of uniform transverse and vertical distribution of the circulating air was also evident.

R. A. 2, 44 (1947).

(2712) Howard, L. B. Interview with Dr. Rudolph Plank on Other Workers in Food Research and Processing. Report on Investigation for Food & Agr. T. I. I. C.-Subcommittee. Off. Pub. Bd., Report, PB 1726, 1945. 5 pages. - Information obtained on work of food experts, among them the following: (1) Dr. George Krause, who devised Krause drum process for concentration of fruit and vegetable juices by freezing out water and separation of ice, (2) Dr. H. Classen, who designed food drying equipment, vertical tube evaporators, and similar machinery, (3) Dr. Leonhardt Riedel, who developed mathematical formulae expressing rates of heat penetration under various circumstances. Manuscripts, bulletins, and reprints evacuated are given.

B. S. I. R. 2, 183-84 (1946).

(2713) Howard, L. B. and Campbell, H., "Dehydro-freezing--New Way of Preserving Food (Fruits and Vegetables)." Food Indus. 18, 674-76 (1946). - Dehydration which removes about 2/3 of the water content followed by freezing storage results in excellent products in most instances. Advantages of this new dehydrofreezing method are the savings in weight, space, packaging materials, and refrigerator loads.

B. J. A.

(2714) Howe, E. W., "Meats--Quick Freezing of Meats Governed by Simple Rules." West. Canner & Packer 34, No. 13, 47 (1942). - Important points to be considered in the quick-freezing of meat are its selection, dressing, chilling, aging, cutting, wrapping, freezing, storage, and storage in the household refrigerator.

M. B.

(2715) Huddleson, E. E., "Locker Operators Must Merchandise." Frozen Food Indus. 2, No. 11, 18-9, 33-4, 48 (1946). - Selling of frozen food by locker plants.

(2716) Huff, A. E., "Transportation of Frozen Foods." Air Cond. & Refrig. N. 50, No. 1, 20-1 (1947). - Frozen foods should be transported at temper-

atures not higher than 0° F. Heavily insulated cars, trucks, or ships, and careful attention to servicing, loading, and unloading to prevent temperature fluctuations are required to meet this demand. A new type refrigeration system is needed to replace the present methods of using water-ice and salt, or carbon dioxide ice.

R. A. 2, 118 (1947).

(2717) Hulse, C. W., "Quick Freezing Plants and their Operation." Ice & Refrig. 112, No. 5, 43-7 (1947). - A review.

R. A. 2, 199 (1947).

(2718) Hunt, L. W., et al., The Effect of Preservation on the Nutritive Value of Food. U. Wash., Wash. Agr. Expt. Sta., Pop. Bull. No. 175, Pullman, Washington, 1944. 24 pages. - A review, including such topics as the effect of blanching on foods to be frozen, vitamin content of fruits and vegetables, meats, eggs, milk, ice cream, and butter. Containers for frozen foods are also discussed.

B. J. A.

(2719) Hutchings, B. L., and Evers, C. F., "Quality Control of Precooked Frozen Foods." Food Indust. 18, No. 2, 184-87 (1946). - Storage quality tests are necessary in developing precooked vegetable field. Bacterial contamination is possible during cooling and packaging. Investigations must still be made of the effects of antioxidants, gums, glazes, stabilizers, types of flours, leavening agents, type of oils, and denaturation. Over 40 cooked foods are now commercially frozen.

B. A. 20, 1332 (1946).

(2720) Hutchings, B. L. and Evers, C. F., "Pre-cooked Packaged Frozen Foods." Natl. Provisioner 114, No. 3, 18-20 (1946).

(2721) Hutchings, B. L. and Evers, C. F., "Research and Quality Control of Pre-cooked Frozen Foods." Refrig. Engineering 51, No. 1, 26-9; Canner 103, No. 3, 13-4, 26-8 (1946). - The production of frozen cooked foods is increasing rapidly and presents new and difficult problems in commercial plants. Quality control of these products will involve plant sanitation, personnel cleanliness, quality of raw materials, sorting, washing and trimming, temperature and timing of processing, packaging materials and methods, freezing techniques, and storage. Unanswered problems include the extent to which foods should be cooked before freezing, what and how much flavoring to add, how to prevent separation of oil and coagulation of proteins, and how best to defrost and serve frozen cooked foods.

R. A. 1, 91 (1946).

(2722) Hutchins, T. S., "Present Aspects for Frozen Foods. I-II." Yankee Food Merchant 6, No. 4, 12-3; No. 5, 15-6 (1946); South. Canner & Packer 7, No. 2, 18-20, 23 (1946); Dom. Com. 33, No. 12, 30-2 (1945).

(2723) Imhof, A. H., "Pre-cooked Meat Dishes en casserole." Frozen Food Indus. 3, No. 2, 21, 44-45 (1947). - Complex vegetable-meat mixtures can be successfully prepared, frozen, and stored. Less cooking of vegetables is necessary because of the tenderizing effect of freezing.
R. A. 2, 184 (1947).

(2724) Inglis, W., "Factors in Successful Production of Frozen Pies." West. Canner & Packer 39, No. 10, 73 (1947). - High quality aims for both fruit fillings and frozen pastry are stressed in order to compensate for the additional cost of frozen goods. Eight-inch pies seem to suit the purchasers' requirements best.
B. J. A.

(2725) Inman, W. R., "Digestibility of Frozen Beef Tripe, Frozen Lip Meat, Frozen Beef Hearts, and Frozen Beef Udders. II." Sci. Agr. 22, 33-9 (1941).

(2726) Jaffe, J. H., "Analysis of the Frozen Food Store." Food Merchants Advocate 62, No. 7, 19, 23, 25 (1946).

(2727) Jaffe, S., "Frozen Food Lockers in Apartment Houses." Quick Frozen Foods 8, No. 5, 128-30 (1945).

(2728) James, H. C., "Importance of Maintaining Quality in Frozen Foods." Canner 101, No. 20, 30 (1945).

(2729) Jensen, L. B., Microbiology of Meats. Second Edition. Champaign, Illinois: Garrard Press, 1945. 1126 pages.

(2730) James, L. H., "Effects of Freezing on the Spores and Toxin of Clostridium Botulinum." J. Infectious Diseases 52, 236-41 (1933). - In a study of the effects of freezing on the spores and on the toxin of Cl. botulinum, the following points have been made: (1) dried spores of Cl. botulinum, type B (onion strain), suspended in a buffer solution of pH 6.9 and in pea juice of pH 7.1 were not killed or materially reduced in numbers by either slow or quick freezing; (2) botulinus toxin frozen and defrosted fifteen times was not reduced in strength.

Author's Summary.

(2731) Jepsen, A., "Biological Problems in Connection with Chilling and Freezing of Meat. I, II." Dansk Teknisk Tidsskrift 69, No. 2, 31-4; No. 3, 47-50 (1945). - The microbiological conditions in meat during slaughtering and chilling are described, together with the different sources of infection, especially that originating from the skinning of the animal. Tables and curves are given showing the growth of bacteria on chilled meat. Also, the structural changes in meat during freezing are explained.

R. A. 2, 31 (1947).

(2732) Jerome, F. E., "A Banker's View of the Frozen Food Industry." Quick Frozen Foods 9, No. 7, 67, 76 (1947); West. Frozen Foods 8, No. 4, 3-4, 12-13 (1947); West. Canner & Packer 39, No. 4, 94-5 (1947); Packer 46, No. 17, 5 (1947). - A general discussion of the marketing needs and aims of the frozen food industry.

B. J. A.

(2733) Johns, C. K. and Berard, H. L., "The Effect of Freezing and Cold Storage upon the Bacterial Content of Egg Melange." Sci. Agric. 26, No. 1, 34-42 (1946). - Freezing reduced by 2/3 the number of bacteria present in whole egg melange. Subsequent storage at -15° C. for 6 months had little further effect, although E. coli died off after 3 months. This treatment reduced the proportion of Pseudomonas, but other genera were variable. There was no concentration of bacteria and egg solids in the center of the block. Plate counts at 37° C. were much lower than at 30° C., and direct microscope counts at 30° C. were slightly lower than plate counts.

N. A. R. 16, 28 (1946).

(2734) Johnson, P. E., "Storage of Frozen Cream for Ice Cream Making." Ice Cream R. 30, No. 4, 46, 60, 62 (1946). - Frozen cream with superior keeping quality can be obtained by condensing cream of good quality having approximately equal quantities of serum solids and fat, and a total solids content of about 60%. This can be accomplished by standardizing milk to approximately 8.3% butterfat and condensing to a ratio of 3.5:1. High serum solids cream prevents, to a great extent, oiling off of butterfat. Ice cream made from cream stored for periods of 3 and 6 months at 0-10° F. was of high quality.
R. A. 2, 103 (1947).

(2735) Johnston, G. E., "Frozen Fruit; Designed for Use in the Baking Industry." Bakers D. 19, No. 6, 24-6 (1945). - Frozen cherries, blueberries, apples, plums, apricots, and peaches are superior to dried or canned fruits for bakery products, due to the ease of handling and higher quality of the finished product. The frozen fruit compares favorably with the fresh only when extreme care is taken in preparation, freezing, storing, and thawing.
R. A. 1, 81-2 (1946).

(2736) Jones, A. H. and Pieroe, M. E., The Significance of Mioroorganisms in Frozen Fruits and Vegetables. Paper presented before Canadian Public Health Assooiation December 17, 1946. - Variations in the microbial load on raw materials are enormous, and weather conditions such as temperature and humidity have been shown to be important factors. These variations have no effeot on the palatability of the product, but high counts predispose to more rapid spoilage under poor handling conditions. Washing and blanching of vegetables may effect a reduction of over 99% of the initial microbial load. Four frozen vegetables, analyzed before freezing and at 6 week intervals while in 0° F. storage, showed a marked reduction in the bacterial population during the first 6 weeks, followed by a slower decline in count. With raspberries and strawberries packed in sirup, the decrease was slower. With blanching suffioient to destroy peroxidases, spore-forming organisms comprise almost the entire flora provided it is protected from subsequent contamination. High counts in blanched products are therefore of significance to regulatory authorities as a check on plant sanitation. Micrococci are more resistant to freezing than other non-spore-forming organisms. Some enterotoxin-forming strains were found in frozen vegetables, which emphasizes the need for oareful handling after defrosting and for improvement in plant sanitation.
R. A. 2, 108 (1947).

(2737) Jones, D. B., Murphy, J. C., and Moeller, O., "Effect of Long-Continued Storage at Low Temperature on the Vitamin A Content of Eggs." Amer. J. Physiology 71, 265-73 (1925). - The results of these feeding experiments show that no serious deterioration had taken plaoe in the vitamin A content of the eggs which had been held in storage for 9 years in a frozen condition. In 0.25 gram daily doses, the storage eggs were found to be as effective as fresh eggs in curing xerophthalmia. Even 0.1 gram daily oaused noticeable improvement in the condition of the eyes, arrested the decline in weight, and caused a moderate resumption of growth whioh continued for 2 to 5 weeks. The somewhat poorer results obtained with the storage eggs than with the fresh eggs suggest that a slight deterioration may have taken place during the period of storage. However, when the difficulties and possible sources of error involved in the present available methods for estimating vitamin A are considered, such slight differenoes as were found in the vitamin A content of the fresh and storage eggs cannot be of much significance.
Author's Summary.

(2738) Jones, J. B., Wood, M., Phillips, M., Harris, K. W., and Fenton, F., The Effect of Quantity Cooking Methods on the Ascorbic Acid, Thiamine, and Riboflavin Retention in Commercially Frozen Broccoli. University N. Hamp. State Agr. Exp. Sta., Natl. Coop. Proj. 2 pages. - Birdseye frozen broccoli was used for cooking, and vitamin tests as well as palatability tests were run. Buds of frozen broccoli contained less ascorbic acid and more thiamin and riboflavin than stems. Cooking in a steamer without water retained highest percentage of all vitamins.

B. J. A.

(2739) Jones, O., "Control of Meat Spoilage. I-III." Food 10, 327-8 (1941); 11, 25-27, 36-38 (1942). - I. Methods which have been suggested for the detection of spoilage in meat are disoussed. Spoilage control can be effected by the complete inhibition of bacterial action and mould growth. II. Amongst methods which have been used for spoilage control, including the use of desiccation, chemical antiseptics, preservatives (NaCl, vinegar, sugar), smoking, chilling, and freezing, the last two methods are the most widely used. Chilled meat will keep well for short periods, but for longer storage hard freezing is necessary. Meat frozen slowly loses its texture and exudes an excessive amount of "drip" on defrosting; both these disadvantages can be largely overcome by rapid freezing. III. Several commercial processes for the rapid freezing of meat are described. Since quick-freezing processes are costly, efforts have been made to prolong the storage life of chilled meat. This has been successfully achieved by storing the chilled meat in an atmosphere containing 10% of CO_2.

Br. A. BIII, 108-9 (Apr.,1942).

(2740) Jones, O., "Freezing and De-freezing of Meat." Food 11, 115-6, 131-2 (1942). - Meat, particularly beef, frozen in large pieces is inferior to home-killed meat. The rate of freezing of such pieces is comparatively slow, resulting in ice crystals outside the muscle fibres, distortion, and sometimes rupture of those fibres, and loss of drip on thawing. The effects of these and other changes, dependent on the time and temperature of storage in the frozen state, on meat quality are discussed.

Br. A. BIII, 153 (June, 1942).

(2741) Jones, O., Modern Methods of Food Preservation. Great Britain and Ireland: London, Roy. Inst. Chem., 1945. 30 pages. - Cold storage, quick freezing, and dehydration.

(2742) Joslyn, M. A., "Freezing Grapes and Grape Juice." Fruit Products J. 8, No. 12, 11, 12, 21 (1929). - Experiments are reported on the successful freezing of California grape juice, crushed grapes, and whole grapes. If the former is to be frozen in large barrels, precooling is recommended. For whole grapes, sharp freezing of the unstemmed berries in a dilute sirup is the preferred method. Storage at 15-20° F. is mentioned.

B. H. W.

(2743) Joslyn, M. A. and Marsh, G. L., "Effect of Freezing Rate on Texture." Ice & Refrig. 86, No. 3, 193 (1934). - The authors believe that there is an optimum rate of freezing for a given product not necessarily determined by temperature alone. Variety, maturity, and growing conditions probably affect this. This optimum rate of freezing may be most economically attained in some cases by installing a blower in the sharp room, in others by

lowering the temperature, and in still others by brine freezing or agitation of container. Examples indicate that faster rates of freezing produce more tender frozen foods.

M. B.

(2744) Joslyn, M. A. and Kilner, S., "Experiments on Frozen Pack Ripe Olives." Proc. Ann. Tech. Conf. Calif. Olive Assoc. 21, 1942.

(2745) Joslyn, M. A., "Enzyme Activity, Index of Quality in Frozen Vegetables." Food Industries 18, 1204-10, 1334 (1946). - A review of enzyme activity in frozen vegetables and a discussion of the catalase and peroxidase tests are presented.

C. A. 40, 7439 (1946).

(2746) Joslyn, M. A., "Industry Needs Field Servicemen and Technologists." Quick Frozen Foods 8, No. 8, 71-72, 126 (1946). - Includes discussion of quality of frozen food.

(2747) Joslyn, M. A., "Investigations on Use of Liquid Sugar in Freezing Apricots and Peaches." Quick Frozen Foods 9, No. 9, I-II (1947); Fruit Prod. J. 26, 235-7 (1947). - Sucrose solutions were rated best, with dextrose poorest and modifications ranging between. The rate of temperature reduction was directly proportional to the sirup concentration during cooling; increased concentration lowered both freezing temperature and crystallization. Factors affecting sirup selection include (1) economic--availability and price; (2) regulatory--conformity to state and Federal laws; (3) technical--compatability with fruit; (4) engineering--adequate mobility; and (5) biochemical--effect on nutrition.

R. A. 2, 179 (1947).

(2748) Jul, M., "Freezing of Foods. I-IV." Ingenioren 53, No. 12, K97-102, 105-10 (1944); 54, No. 1, K1-4; No. 3, K17-20; No. 4, K25-7 (1945). - A survey of the prospects of the industry, the methods used in freezing, and the research carried out on the effects of freezing.

R. A. 2, 42 (1947).

(2749) Kable, G. W., "The Agricultural Engineer's Interest in Farm Food Processing." Agric. Eng. 26, 11, 15 (1945). - Some food processing problems existing on farms are reviewed. These include butchering, poultry dressing, butter and cheese making, cooling and pasteurizing of market milk, dehydrating and freezing of farm products. The agricultural engineer's interest is in the design of equipment used in processing.
R. A. 1, 14 (1946).

(2750) Kaloyereas, S. A. Freezing Foods for Home Use. La. Agr. Expt. Sta. Bulletin No. 404, 1946. 16 pages.

(2751) Kaloyereas, S. A., "The Effect of Various Methods of Blanching on Ascorbic Acid and Soluble Solids in Cauliflower and Spinach: Effect of Rapid Freezing on Catalase Test." Fruit Prod. J. 26, No. 1, 134-5 (1947). - Losses of ascorbic acid and soluble solids in unidentified varieties of cauliflower and spinach shipped to Louisiana from Colorado were determined under various conditions of blanching followed by cooling in ice water. For cauliflower, blanching in boiling water for $2\frac{1}{2}$ minutes resulted in an 18.3% loss of ascorbic acid and a 25% loss in soluble solids; blanching with a dielectric heater at 11 megacycles (10 minutes at 212° F.) resulted in 55% loss in ascorbic acid but no loss in soluble solids; blanching in a 5% brine containing 0.125% Na_2SO_3 for 1 minute resulted in 1.7% loss in ascorbic acid and 19.4% loss in soluble solids. For spinach, blanching for $1\frac{1}{2}$ minutes in boiling water resulted in 51.6% loss of ascorbic acid and 25.8% loss of soluble solids; in dielectric heat (5 minutes at 212° F.) 72.8 and 0%, respectively; in 5% brine containing 100 mg. ascorbic acid per 100 g., 48% loss in ascorbic acid; in 5% brine containing 0.125% Na_2SO_3, 9% loss of ascorbic acid and 12.1% loss in soluble solids. Dipping cauliflower in a 4% SO_2 solution for 2 minutes without heat treatment resulted in a loss of but 16.7% ascorbic acid after storage for 6 months. Rapid freezing of spinach by direct immersion in an alcohol-dry ice mixture at -85° F. gave a product that could be stored for short periods at 0° F. without blanching. The catalase test in products frozen in alcohol-dry ice at -85° F. was less pronounced than in products frozen at 0° F. in still air.
R. A. 2, 95 (1947).

(2752) Katkoff, V., "Frosted Fruits for Ice Cream." Quick Frozen Foods 3, No. 9, 14-5, 40-2 (1941). - Because of the economy and good flavor of quick frozen fruits, an increasing amount is being used each year in ice cream manufacture. At present, this industry consumes 40 per cent of the total frosted fruit pack, while preserves, institutional trade, bakeries, retail trade, and others consume decreasing amounts in that order.
B. J. A.

(2753) Kaufman, C. W., "Common Ailments of Quality in Processed Foods." Food Indust. 18, No. 1, 12-15 (1946). - Enzymatic changes, chemical reactions, rancidity changes, retrogradation, and denaturization are among the general deterioration reactions which apply rather broadly to many types of dehydrated and other food products. Perhaps the most prevalent chemical reaction in dehydrated foods is the amino-aldehyde type which produces

bitter flavor and dark color on storage; its control is the most important quality problem today.

B. A. 20, 1332 (1946).

(2754) Keith, S. C., Jr., "Factors Influencing the Survival of Bacteria at Temperatures in the Vicinity of the Freezing Point of Water." Science 37, No. 962, 877-9 (1913). - Earlier experiments conducted by bacteriologists seemed to indicate that the lower the temperature, the greater the destruction of bacteria in water. More recent conclusions from experiments with B. coli bacteria are that low temperatures alone do not destroy bacteria, and that in many cases they favor bacterial longevity by diminishing destructive metabolism. In water-bearing food materials held at low temperatures, the bacterial death rate increases as the dilution, until, in pure water it becomes greatest. In solid crystalline masses, their death is attributed to mechanical destruction between the crystals; this is most easily accomplished in pure crystalline water.

A. S. C.

(2755) Kenworthy, A. L., Baker, G. L., and Gilligan, G. M., Peach Freezing Studies. Univ. Del. Agric. Exp. Sta. Ann. Rep. for 1944-5, Bull. No. 259, 1945. 33 pages. - Preliminary studies indicate that fumigation of peaches with methyl bromide (2 lb. per 1,000 cu. ft.) caused them to ripen more uniformly and 2 or 3 days earlier than fruit not fumigated. The fumigated fruit, however, had an off flavor when cold packed. Ripening peaches in cold storage appeared to reduce the quality of subsequent frozen pack.

R. A. 2, 179 (1947).

(2756) Kerr, R. G., Pottinger, S. R., and Tempelton, G. S., "Will Frozen Fryer Rabbits Keep?" Rabbit Raiser 1, No. 5, 12 (1946).

(2757) Kertesz, Z. I., Spinach Freezing in Liquid Nitrous Oxide. U. S. Dept. Com. Off. Pub. Bd. Report PB2039, 1945. Pages 59-60. - Appendix to accompany FIAT Final Report No. 212 (Pub. Bd. 1269): Quick Freezing of Foods in Liquid Nitrous Oxide, by G. MacKinney.

(2758) Kertesz, Z. I., Report on "Chemical Blanching", a Summary Report on 7 Targets of Opportunity. Off. Pub. Bd., Report, PB6352, 1945. 4 pages. - The Germans occasionally obtained good results by blanching with ether vapor in the preparation of plant tissues for dehydration and freezing. More knowledge on the reactions involved is needed before a decision on commercial applicability can be reached.

B. S. I. R. 1, 305 (1946).

(2759) Kertesz, Z. I., Observations on the German Fruit Juice Industry. Off. Pub. Bd., Report, PB8264, 1945. 13 pages. - High quality fruit juices and fruit juice concentrates were produced on large scale in Germany during the war. The germ-proofing filtration method of Seitz and its modification by Bohi gained wide acceptance. Freeze-concentration by the Krause-Linde method, developed and patented early in the war, obtained wide acceptance for fruit juices as well as for certain vegetable juices. The possible influencing of flavor development by the use of enzymes and the cold-ray sterilization of fruit juices by the methods developed for milk are also

discussed, together with a number of special products developed during the war. List of ten targets investigated is given, including name and description, location, and personnel interrogated. See also PB8263, "Some Developments in the German Preserves Industry During World War II."
B. S. I. R. 1, 552 (1946).

(2760) Kertesz, Z. I., "Germans Using Improved Methods to Preserve Fruit Juices; Mellowing by Mold Enzymes, Concentration by Continuous Freezing, Storage in CO_2 under Pressure." Food Ind. 18, No. 4, 496-8 (1946). - Discussion of production of unfermented fruit juices of fine quality by methods unknown or unused in this country, most of which are applicable only to clarified juices. Interesting developments by the Germans were the "mellowing" of fruit juices and wines by the use of mold enzymes, the use of storage to improve flavor, sterilization by filtration (chiefly by the Seitz-Bohi or "germproofing" method), ultraviolet sterilization, concentration of juices by vacuum evaporators and continuous freezing, and the manufacture of special fruit products to provide vitamins.
A. S. C.

(2761) Kessler, H., "The Selection of Varieties, an Important Factor in the Production of Good Quality Frozen Products in Orchards and Kitchen Gardens." Landw. Jahrb. der Schweiz 60, 251-95 (1946).

(2762) Kethley, T. W., "Progress Report on Georgia Tech Food Freezing Research." The Research Engineer 8, No. 12, 11-16 (1946). - As mentioned by Slack (The Research Engineer 9, No. 2, 3 (1947)), the State Engineering Experiment Station of the Georgia School of Technology began a research investigation on the preservation of foods by freezing, jointly sponsored by the TVA. A preliminary project analysis showed the need for much fundamental research on the biology, chemistry, and physics of foods if sound processes were to be developed. In addition, much work on techniques of examination and analysis appeared in order. Work on many of these aspects has accompanied the erection of a large refrigerated work room, two low-temperature storage rooms, a small immersion freezer, and experimental blanchers, quenchers, and a centrifuge, all of which involved engineering design research. The Literature Search on the Preservation of Foods by Freezing was prepared for guidance and was later published for general use. Research is under way on a number of problems.
B. H. W.

(2763) King, H. B., "A Production Control Program for Frozen Fish." Frozen Food Ind. 3, No. 7, 12-3, 37-39 (1947). - The commercial plant for quick-freezing of fish must be located near an adequate supply of really fresh fish since the chemical and physiological changes of decomposition take place in fish very shortly after death. In the processing plant careful handling is essential. The fish are examined for freshness, scaled, washed, and cut. The fillets are inspected, packed, and then frozen by two 20 H.P. Brunner low-temperature, water-cooled, condensing units using Freon. This process does not include brining; therefore, the freezing operation time is minimized and the frozen product retains its fresh flavor.
M. B.

(2764) Kirby, W. P., "Aggressive Merchandising Is Vital to a Locker Plant's Future." Quick Frozen Foods 9, No. 6, 128, 129 (1947).

(2765) Kirk, G. P., "Controlling Quality in Frozen Eggs." Quick Frozen Foods 6, No. 9, 25 (1944).

(2766) Kirkpatrick, M. E., "Frozen Blueberries: Home Processing and Use." J. Home Econ. 38, 291-292 (1946). - The Scammell and Jersey varieties of blueberries were frozen (1) without sugar, (2) with 40% sucrose sirup, and (3) with one part dry sugar to five parts fruit. The berries packed with sugar or sirup were superior to the non-sugared ones, and the unscalded fruit was found to have a better appearance and taste than scalded berries. Blueberries can be used successfully in making puree.

M. B.

(2767) Klein, G. T., "Cooling, Packaging, and Freezing of Poultry." Everybody's Poultry Mag. 50, No. 11, 10, 38, 39 (1945).

(2768) Kline, E. A., "How to Handle Meats for Lockers." West. Frozen Foods 7, No. 10, 3-4 (1946); Aberdeen-Angus J. 28, No. 1, 66, 114-120 (1946); Berkshire News 11, No. 12, 58-60 (1946).

R. A. 2, 43 (1947).

(2769) Klocke, Jessie, et al., "Nutritive Value of Fish from Michigan Waters. I. Nicotinic Acid of Lake Herring, Carp, Common Suckers, and Burbot." Food Research 11, 179-86 (1946). - Lake herring contained 23-55γ of nicotinic acid per g., depending on the time of year and environment. Common suckers contained 11 to 13, carp 15, burbot 16, carp roe 13, and herring roe 6 γ of nicotinic acid per g. There was wide individual variation. There was no significant loss of nicotinic acid during freezing or subsequent storage for up to 3 months, or during baking of the fresh or frozen fish. Smoked herring and common suckers retained 66 and 72%, respectively, of nicotinic acid in the processed fish. The nicotinic acid content of fresh, frozen, and smoked lake herring is comparable to the nicotinic acid content of lean meat. The content of carp, burbot, and common suckers is slightly lower.

C. A. 40, 7435 (1946).

(2770) Knott, J. E., "Selecting, Harvesting, and Handling Vegetables for Freezing." Fruit Prod. J. 26, No. 1, 149, 152 (1947). - Specifications for vegetables for freezing are similar to those for the fresh market. The type and variety must be adaptable to the climate in which the crop is grown to develop optimum flavor and texture. Vegetables must be harvested at the proper time to obtain the greatest yield and the highest sugar-starch ratio. They should be kept under refrigeration if they are not processed immediately. Operations in the plant cannot overcome mistakes in these basic requirements.

R. A. 2, 93 (1947).

(2771) Knowles, F. W., "A Discussion of Belt and Shaker Systems of Freezing." Food Freezing 1, No. 10, 488-9, 511 (1946). - In the tray system, the products are frozen on racks of trays which are moved through the freezer on casters, lift trucks, or conveyor chains. This system is simple but requires considerable hand labor and results in slow freezing. In the belt system, the products are conveyed through the freezer on continuous belts of various types and sizes, the most usual type being made of circu-

lar wire mesh. Combined belt and shaker systems offer certain advantages, particularly the prevention of products freezing together. Correct air velocity is very important in these systems and should have a value of 400-700 f.p.m. Prefreezing is now widely used with tray, belt, and shaker systems. The product is prefrozen and glazed at about 25° F. The ice glaze prevents dehydration and sticking. Materials that are frozen by the different methods are listed. Costs of trays and other equipment are given.
R. A. 2, 43 (1947).

(2772) Knowles, F. W., "The Case for Package Freezing." West. Frozen Foods 8, No. 2, 3-4 (1946). - The need for higher quality in frozen foods, less possibility of contamination of foods by freezer parts which are difficult to clean, and the elimination of excessive hand labor make a continuous package freezer almost imperative. An air blast freezer of this type was built and tested. Increasing the air velocity above 1200 ft. per minute did not decrease the freezing time appreciably.
R. A. 2, 114-15 (1947).

(2773) Knowles, F. W., "Freezing Methods Analyzed." Food Pkr. 28, No. 4, 41-42 (1947). - Air blast freezers of the tray, belt, and shaker types are widely used for freezing fruits and vegetables whether in bulk or in packages. Tray systems are simple to operate but freeze the products slowly and require considerable manual labor. Practically all northwest plants have adopted prefreezing systems in which the food is cooled and glazed at mild temperature. The freezing is completed at -25° F. or lower with air velocities of 400-700 f.p.m. Data are given on costs of freezing equipment and operation.
R. A. 2, 193 (1947).

(2774) Knowles, F. W., "Air Blast Tunnels Common Northwest Freezing Method." West. Canner & Packer 39, No. 7, 74-7, 81 (1947). - A discussion is given of four particular air blast freezing plants in the Northwest. The simplest uses a series of trucks and trays placed in the air stream and allowed to remain there until the materials are frozen. A more economical method now used involves a belt-type freezer (60-100 ft. long and 4-6 ft. wide) in which the air may either be blown up through the produce being frozen or blown down through it. Coil arrangements of belt freezing systems are also used, some of which have as much as 16,000 ft. of 2 in. pipe installed in one bank and have a capacity of $2\frac{1}{2}$ tons of frozen produce per hour. Another plant uses 7 prefreezer belts and 7 quick freezer belts, each 6 x 10 ft., with an air velocity of 1000 ft. or more per minute. A peak load of 55 tons daily is gotten by loose freezing the materials first and then package-freezing. A very unusual arrangement is found in a plant which employs close-in vining. Vines (of peas) are brought straight in from the near-by fields, and peas are vined, passed on a conveyer directly into the plant, and are in the freezer 5-6 minutes after they are beaten out of the pods. One and one-half tons are handled hourly. Peas are pre-frozen at 25-27° F., and then quick-frozen in air at -25° F. The cost of continuous loose freezing, as here described, ranges between $7 and $8.30 per ton. Corn costs more to freeze than peas or beans, with beans the easiest and cheapest item to freeze.
B. J. A.

(2775) Kohman, E. F., "Preservation of Nutritive Values of Foods in Processing." J. Am. Med. Assn. 120, 831-38 (1942). - Freezing and Canning

effects on vitamin C content are discussed. Tomatoes were tested by extraction and titration with 2, 6-dichlorophenolindophenol, and showed that cooking without oxygen caused no loss in ascorbic acid. The higher the humidity of the storage chamber (41° F.), the less the loss in ascorbic acid, as well as vitamin A and thiamine. Vitamin C retention in vegetables may be used as a criterion of both quality and nutritive value in general. Blanching for frozen foods was not successful using hot water as a medium. Vitamin C appeared to be both extracted and destroyed by the treatments which in no case completely inactivated the enzymes. Glutathione and hydrogenases are inactivated, leaving the vegetable saturated with oxygen which can react unfavorably with vitamin C if frozen vegetables are thawed at any time during storage. Quick freezing is recommended, using liquid air as a freezing medium. Canning, dehydration, and miscellaneous processes are also discussed.

B. J. A.

(2776) Kolb, C., "Complete Data of Army's 1943 Frozen Food Procurement Plan." Quick Frozen Foods 5, No. 5, 18 (1942). - The armed services in the United States ordered 70,900,000 pounds of frozen vegetables in 1943, 97 per cent of which were to be supplied by 21 of the larger packers in the country. The Army's preferred assortment included five items: spinach, cut corn, snap beans, peas, and lima beans. Discussion is included on the submitting of assortments to the Office of the Quartermaster General by the packer, A. M. A. grading, and packaging of foods for Army use.

M. B.

(2777) Kolb, Carl, "The Use of Quick-Frozen Fresh and Pre-Cooked Foods by Transportation Facilities." Quick Frozen Foods 9, No. 11, 72-3 (1947). - A general discussion to inform the railroad galley operators of things to expect in frozen food utilization and future possibilities.

B. J. A.

(2778) Kolb, C., "Quick-Frozen Foods for Diners." Rwy. Age 122, 791,802 (1947). - A discussion of the advantages of using quick-frozen foods on railroad diners. Plans for the cutting of maintenance costs, speeding up of service, serving of better quality food, and availability of a wider menu variety are presented, employing quick-frozen foods. The status of frozen pre-cooked foods is shown as one calling for more research, since individual peculiarities of foods require individual solutions. The author concludes that the railroads can cook and freeze their own pre-cooked foods by carefully observing the necessary precautions.

A. S. C.

(2779) Kondrup, M., "Freezing of Fish." Polyteknikeren 11, 253-60 (1945)

(2780) Koonz, C. H. and Cooley, L. P., "Evisceration of Frozen, Defrosted Dressed Poultry." Food Res. 12, 1-3 (1947); Ice & Refrig. 112, No. 4, 53-4 (1947); US Egg & Poultry Mag. 53, No. 6, 27-8 (1947). - The quality of eviscerated poultry placed directly in a -28.9° C. (-20° F.) freezer without chilling in a conventional manner was very good. Frozen dressed poultry should be eviscerated promptly after defrosting. Chilling poultry rapidly to a low temperature tends to protect the quality in the event that birds later are subjected to adverse holding conditions.

R. A. 2, 185 (1947)

(2781) Krall, J. W., "Frozen Food Cabinets for Store and Home." Can. Refrig. J. 13, No. 4, 13 (1947). - A brief review is given of the development of the first quick freezer and the open style self-service retail cabinets. Precautions for the selection of home freezers and storage units are discussed.

R. A. 2, 198 (1947).

(2782) Kristensen, V. D., "Frost Damages on Cold Storage Warehouses." Ingenioren 54, B53-6 (1945). - Damages originating from freezing of the ground underneath buildings may be prevented in 4 ways: (1) by raising the temperature in the basement rooms, (2) by increasing the heat resistance of the floor, (3) by adding heat to the ground under the building, and (4) by removing the layers which might freeze and replacing them with safe material. Measure (1) cannot usually be considered; (2) is not economical for low temperatures; (3) seems to offer possibilities by the use of electric heating or hot water in steel pipes; (4) can be used occasionally and may be economical. Examples of calculations are given, with special reference to conditions under partition walls and columns.

R. A. 2, 14 (1947).

(2783) Kudriashov, N., "Refrigerator for Freezing Poultry." Promysh. SSSR. Sborn. 1, 49-52 (n.d.).

(2784) Lacey, J. J., Hayes, J. B., and Dennett, L. C. Fast Freezing Meats and Poultry. Wis. Agr. Col. Ext. Circular No. 4-H4, Revised, 1945. 6 pages.

(2785) Lampitt, L. H., Baker, L. C., and Parkinson, T. L., "Vitamin C Content of Vegetables. II. Effect of Storage on Raw Vegetables. III. Average Figures for Raw Vegetables." Jour. Soc. Chem. Indust. (London) 64, No. 7, 200-03 (1945). - Loss of vitamin C from lettuce, broccoli, cabbage, and spinach during storage at room temperature (20° C.) occurred at different rates. Vitamin C increased in lettuce, broccoli, and cabbage during the first 2 days of storage at 3° C.; substances interfering with the determination of vitamin C did not develop. Withering of vegetables appears to be correlated with loss of vitamin C in storage. The amounts of vitamin C in 42 raw vegetables are tabulated.

B. A. 21, 321 (1947).

(2786) Landau, H., "Distribution (of Frozen Foods)." Frozen Food Indus. 2, No. 3, 28, 57 (1946).

(2787) Lange, H. K., "Pioneer Iowa Plant Parallels the Growth of Locker Industry." Locker Operator 7, No. 9, 30, 32, 52-54 (1946).

(2788) Langfield, A., "It Pays to Retail Frozen Foods." Food Freezing 2, 402, 439 (1947).

(2789) Lanigan, F. W., "High-speed Packaging of Frozen Foods." Canner 104, No. 2, 58, 60; Food Ind. 19, 106; Packer 46, No. 9, 17 (1947). - Straight-line high-speed production similar to developments in other fields is possible also in the frozen food industry. Packaging materials and methods are an important part of the problem.

R. A. 2, 109 (1947).

(2790) Lantz, A. W., "Taste Appeal of Kippers Prepared from Cold-Stored and Fresh British Columbia Herring Caught in Different Months." Progr. Rept. Fish. Res. Bd. Canada, Pacific Sta. 66, 9-11 (1946). - Kippers made from gill-netted herring caught from January to May were compared monthly as to taste with portions of each month's catch which had been stored at -24° to -28° F. and then smoked. Another portion each month was smoked, stored at -24 to -28° F., and peroxides were determined on the fat at stated intervals. H_2O, fats, and solids in the fresh flesh, peroxide values, and tasters' rankings are summarized in tabular form. Results show that February kippers received the highest rating in all tests, although the peroxide values were not always the lowest. The fat content was high in January (10.6%), falling to 2.6% in April, and rising again to 12.9% in May. Owing to the breakdown in the herring supply during March-May resulting in insufficient data, no conclusions could be drawn as to the effect of seasonal variation in the composition of herring on the keeping quality and flavor of the resulting kippers.

Br. A. BIII, 177 (Aug., 1946).

(2791) Lantz, E. M., "Investigations Reveal Methods for Freezing Green Chili." Food Packer 27, No. 12, 54 (1946). - Green chili was satisfactorily peeled for freezing by dipping the whole pods in paraffin heated to 375-390° F., followed by a cold water dip which caused the paraffin to harden and peel off. The paraffin was then heated, strained, and reused; the pods of chili were cored, deseeded, and packed for freezing. Peeling in this manner inactivated the enzymes, and the product was in excellent condition after being frozen for 9 months.

R. A. 2, 96 (1947).

(2792) Lantz, E. M. Preparing Green Chili for Freezing. N. Mex. Agr. Expt. Sta. Press Bull. No. 1012, 1946. 1 page. - Directions for home preparation of green chili for freezing.

B. J. A.

(2793) Larsen, H., "The Influence of Cold Storage in Glycogenolysis in Fish." K. Norske Vidensk. Selsk. Forh. 17, 44 (1945). - Samples of freshly caught cod were stored at -20° C. for 1 to 2 months. After thawing the lactic acid concentration and pH remained constant.

N. A. R. 16, 30-1 (1946).

(2794) Latimer, R., "St. Louis Baker Sets up Separate Refrigeration Room for Freezing." Baker's Weekly 131, No. 1, 29-30 (1946). - Frozen bakery products.

(2795) Latimer, R., "Frozen Dough Sales Outstanding at new St. Louis Store." Baker's Weekly 131, No. 9, 55-6 (1946).

(2796) Latimer, R., "Store to Door Distribution for Frozen Foods." Quick Frozen Foods 8, No. 6,78, 91 (1946). - Trailer stores.

(2797) Lavers, C. G. and Pearce J. A., "Liquid and Frozen Egg. II. Methods of Determining Solids Content of Liquid and Frozen Egg." Canadian Jour. Res., Sect. F. Technol. 24, No. 3, 183-90 (1946). - Relations between the solids content of defrosted frozen egg and unfrozen liquid egg and refractive index, as determined with sugar refractometers, were calculated for the method involving the addition of ammonium hydroxide. The method provides a rapid, convenient, and accurate means for determining solids content.

R. A. 2, 102 (1947).

(2798) Lawrence, G. N. Linde Eismaschinenfabrik, Wiesbaden. (B. I. D. S. Evaluation Report 294). Off. Pub. Bd., Report, PB 11368, 1945. 1 page. - Details of the working of Krause drum freeze concentrator, Karussel rotary blast freezer, and Linde freezer are presented. The Krause drum freeze concentrator dehydrates juices by vacuum drying at 20-30° C., the other two units preserve food by freezing.

B. S. I. R. 1, 773 (1946).

(2799) LeBeaux, J. M. and Woolrich, W. R., Jr., "The Shellfish Industry in Texas." J. Arch., Eng. & Ind. 7, No. 4, 3-7 (1946). - Approximately 14,000,000 pounds of Texas shrimp is annually sold fresh or preserved by

canning and freezing methods, with freezing gaining in volume each season. Inadequate and expensive freezing facilities are retarding a more rapid growth of this method. Much of the catch is necessarily trucked to inland points under ice refrigeration before freezing, with an additional 2-12 hour period required to freeze packaged shrimp. A method described eliminates this difficulty by immersion of the shrimp in a sugar solution at -2° F. which freezes it individually in approximately 8 minutes. Rapid freezing is important from the standpoint of both economy and quality.

R. A. 2, 190-91 (1947).

(2800) Lee, E. H., "Frozen Egg Quality." Baker's D. 20, No. 12, 138-40 (1946). - Eggs packed in the spring months usually have the best baking qualities since they are more likely to be properly cooled from the time they leave the nest until they reach the plant where they are frozen and stored at 0° F. Frozen eggs are preferred for use in all bakery products because they retain the inherent high qualities of fresh eggs and are available throughout the year. Frozen whole eggs, frozen egg whites, frozen sugar-yolks, and frozen proprietary egg mixtures are generally available in 10 and 30 lb. containers. They must be thawed and mixed well before being used. Thawing may be done at room temperature in 12-14 hours for 10 lb. container or 18-24 hours for 30 lb. container; in running water, 2.5-3.5 hours for 10 lb. or 5-6 hours for 30 lb; by dielectric heating, which will thaw 30 lb. uniformly throughout in a few minutes. Quick thawing improves keeping quality.

R. A. 2, 102 (1947).

(2801) Lee, F. A., "Home Freezing of Popular Vegetables." Farm Res. (N. Y. State Sta.) 12, No. 3, 2, 3 (1946). - Maturity is one of the most important factors to watch in the home freezing of lima beans, corn-on-the-cob, or green soybeans.

B. J. A.

(2802) Lee, F. A., "Vitamin Retention in Blanched Carrots. Alcohol-Insoluble Solids as a Reference Base." Ind. Eng. Chem., Anal. Ed. 17, 719-720 (1945). - Use of alcoholic insoluble solids as a basis for calculating vitamin values of carrots gives consistent results, as contrasted with those based on total solids. Application of this method to other vegetables is suggested. A special technique involving the use of sintered glass crucibles is recommended.

C. A. 40, 650 (1946).

(2803) Lee, F. A. and Whitcombe, J., "Effect of Freezing Preservation on Vitamin Contents of Green Soybeans and Soybean Sprouts." J. Am. Dietetic Assoc. 21, 696-7 (1945). - Analytical data are presented on the vitamin changes during processing, frozen storage, and cooking of 2 varieties of green soybeans and 2 varieties of soybean sprouts. Green soybeans lost a total of 48% of their ascorbic acid; the soybean sprouts, a total of 70%. These and other vitamin (carotene, thiamine, riboflavin, niacin) losses were considered moderate and comparable to those obtained for other vegetables.

C. A. 41, 3231 (1947).

(2804) Lee, F. A. and Masterman, N. K., "Freezing Rhubarb at Home." Quick Frozen Foods 8, No. 10, 146 (1946). - Rhubarb, cut in 1-inch seg-

ments, was preserved by 3 methods, viz., packing in water and storing in sealed jars at 4.4° C.; storing in cartons without packing liquor at -21° C; scalding in boiling water for 1½ minutes and storing in cartons at -21° C. Cooking tests after 7 months showed that the first method was inferior to the other two, which gave good retention of color and flavor. Vars. MacDonald, Ruby, and Linnaeus are recommended for freezing.

B. A. 20, 1962 (1946).

(2805) Lemon, J. M., "Technical Tips on Fish Freezing in the Locker Plant." Food Freezing 1, 48-50, 69 (Dec. 1945). - Data on chemical composition of 50 species of food fish, suggested methods of preparation for freezer locker storage, and probable storage life of 26 species are given.

R. A. 1, 87 (1946).

(2806) Lepper, H. A., Bartram, M. T., and Hillig, F., "Detection of Decomposition in Liquid, Frozen, and Dried Eggs." J. Assoc. Offic. Agric. Chem. 27, 204-23 (1944). - Bacteriological and chemical criteria for decomposition in liquid, frozen, and dried eggs have been carefully developed. In liquid and frozen eggs a microscopic count of over 5,000,000 per gram demonstrates the presence of decomposed eggs. The smell test is reliable for establishing a decomposed condition in liquid and frozen eggs in the absence of other criteria.

B. J. A.

(2807) Lima Sobrinho, A. J. B., "Industria de desidratacao de produtos alimentaires." Brasil. Min. do Trab., Indus. e Com. Bulletin 12, No. 139, 105-21 (1946).

(2808) Lincoln, R. Cooking Frozen Foods. Ariz. Agr. Col. Ext. Folder No. 48, 1946. 8 pages.

(2809) Lockhead, A. G. and Jones, A. H., "Studies of Numbers and Types of Micro-organisms in Frozen Vegetables and Fruits." Food Research 1, 29-40 (1936).

(2810) Loeffler, H. J., "Retention of Ascorbic Acid in Raspberries during Freezing, Frozen Storage, Pureeing, and Manufacture into Velva Fruit." Food Res. 11, 507-15 (1946) - Raspberries retained their ascorbic acid very well during processing, freezing by commercial methods, and storage at -10° F. for periods up to 4 months. The loss was not over 25% when storage was extended to 28 months. Fresh raspberries, on the other hand, lost ascorbic acid on storage at room temperature or when allowed to overmature on the vine. Defrosting the berries at 35° F. in about 24 hours resulted in but a slight loss of ascorbic acid, but when they were held in the refrigerator over half the ascorbic acid was lost. Whole raspberries retained their ascorbic acid well even when frozen without sugar, but sugar exerted a protective effect when the defrosted berries were held in household refrigerator. The loss then was 25-50% greater in the absence of sugar. The protective effect of sugar was not found proportional to concentration; 40-50% sirups were as effective as those of 65-68%. Sugar had a pronounced effect on retention of ascorbic acid in the purees; the unsugared purees in bulk storage lost over twice as much as the sugared in 16 months' storage. Fondant formation due to crystallization of sucrose

was observed when stronger sirups were used, and for this reason as well as the above, the use of sirups over 50% is not recommended.

R. A. 2, 182 (1947).

(2811) Loeffler, H. J., "Quality Control." Frozen Food Industry 2, No. 4, 8-9, 40-2 (1946). - Quality control is discussed as it pertains to the varieties of produce chosen for freezing, growing, and harvesting methods employed, gradation of finished product, and subsequent storage.

B. J. A.

(2812) Logan, P. P., "Army Food." Chem. & Eng. N. 21, 1606 (1943). - The tremendous job of feeding the Army has provided an impetus to food preservation development, particularly drying and dehydrating fruits and vegetables, freezing of vegetables, and packaging capable of resisting extremes of temperature and humidity, rough handling, insects, and rodents. The space-saving and metal-saving potentialities of quick-frozen foods make them attractive to the Quartermaster Corps.

M. P.

(2813) London, A. L. and Seban, R. A., "Rate of Ice Formation." Trans. Amer. Soc. Mech. Eng. 65, 771-78 (1943). - A general approximate method of analyzing the problem of freezing (ice formation) in liquids bounded by surfaces of various geometries is given. Solutions for the rate of ice formation at spherical, cylindrical, and plane boundaries are presented algebraically and graphically and expressed in terms of dimensionless variables. Examples of the application of the method to calculate the freezing time in can-ice manufacture and food refrigeration are given. Actual and calculated times are in good agreement.

Br. A. BI, 150 (May, 1944).

(2814) Lord, D. B., "Huge Florida Plant for Citrus Freezing." South. Food Processing 1, No. 2, 26-8 (1946).

(2815) Loughead, M. E. Selected List of Farm and Home Freezers. U. S. Dept. of Agr., Washington. D.C., 1945. 4 pages.

(2816) Luaces Aguero, J. L., "The Need for Cold-Storage Warehouses." Rev. Ganad. (Habana) 6, No. 7, 25, 57 (1946).

(2817) Lund, A. A., "Vitamin Blocks Color Loss in Frozen Fruit Packs." Food Mater. and Equip. 6, No. 1, 3, 9 (1946). - Synthetic vitamin C as a processing tool.

(2818) Lund, C. E., "Technical Phases of Home Freezer Development." Refrig. Eng. 51, No. 6, 513-20 (1946). - Paper deals only with chest or top opening type cabinet; effect of insulation thickness; temperature gradient; sealing of cabinet walls against vapor transmission; effect of single and double door gasket on vapor transmission; use of structual members in cabinet construction; performance characteristics for different capacities of home-freezer cabinet shown in table.

E. I. 1946, 965.

(2819) Lundin, H., "Preservation of Foods by Dehydration and Quick Freezing." Kgl. Lantbruksakad. Tid. 83, 519-46 (1944). - Set-ups for the dehydration of foodstuffs are described briefly for tunnel, cabinet, and belt-driers, spray and drum driers, and different types of vacuum driers. The blanching process, the packing problem, and the costs of dehydration are dealt with. The selection, cultivation, and improvement of cultivated plants suitable for dehydration are treated. It is maintained that the ratio of the vitamin content of the raw material to that of the final product, calculated on dry weight, is a measure of the mildness or carelessness with which the dehydration process has been carried out. A very brief account is given of some procedures for the quick freezing of foodstuffs. The biochemical processes occurring in plants at low temperatures are touched upon, and mention is made of methods for hindering such of these processes as are harmful during cold storage.

C. A. 40, 140-41 (1946).

(2820) Luther, H. G. and Cragwall, G. O., "Ascorbic-Citric Acids Prevent Browning of Cut Fruit." Food Indust. 18, No. 5, 690-92, 794-800 (1946). - The antioxidant effect of ascorbic acid in cut fruit is destroyed by the enzymes present, resulting in browning and off-flavors. The enzymes are destroyed by blanching or cooking; this is undesirable for frozen products and/or those served in raw state. Small additions of citric acid inactivate the enzymes of apple. Combined use of citric and ascorbic acids is very effective. A mixture of citric acid, ascorbic acid, and sugar sprinkled over sliced fruits holds color and flavor for many hours.

B. A. 20, 2084 (1946).

(2821) Lynn, E. M., "Proposed Pattern for Poultry-Meat Dressing." J. Am. Vet. Med. Assn. 106, 145-52 (1945); J. Milk Technol. 9, 31-6 (1946). - Killing, dressing, eviscerating, inspecting, packing, quick-freezing, and marketing of poultry are discussed. Manufacturers of poultry-dressing plant appliances have drawn up specifications for economical eviscerating equipment, and the makers of freezing units and cabinets of all sizes are prepared to fill their part of the program which in reality is meat inspection at one end and home storage at the other. The veterinary profession is urged to keep in touch with the transformation in the interest of public health and the poultry industry.

R. A. 1, 161 (1946).

(2822) Macara, T. J. R., "Removal of Taints from Frozen Meat and Other Foodstuffs." Mod. Refrig. 50, 63-6 (1947). - Fuel oil, smoke, and citrus oils are the main sources of taints acquired by frozen meat during shipment. The taints can be removed by holding meat at 14-16° F. in an atmosphere containing 0.5 ppm. of ozone. The treatment may require several weeks or several months, depending on the degree and type of tainting. It may cause loss of quality by bleaching, loss of bloom, and oxidation and rancidification of the superficial fat. If the ozone content of the storage atmosphere is above 1 ppm., the meat often develops a bitter flavor. Activated charcoal is effective in the removal of volatile taints such as those from fuel oil.
R. A. 2, 193-94 (1947).

(2823) McBride, R. S., "Frozen Milk May Change Existing Markets." Food Ind. 9, (1937).

(2824) McCallum, D. H., "Estaolishing a Frozen Food Locker Plant." Canad. Dairy and Ice Cream J. 25, No. 8, 34-5, 64 (1946).

(2825) McCay, C. M., "Frozen Dog Food Problems Are Many." Nat. Provisioner 115, No. 20, 14-5 (1946).

(2826) McClelland, B. E. Preservation of Foods by Frozen Storage. Mont. State Col. Ext. Bull. No. 230, 1945. 20 pages. - Discussion emphasizes containers and wrappings for frozen products, temperatures, and length of storage period, the choice of products, directions for preparing for freezing, and the actual serving of fruits and berries, vegetables, meats, cheese, butter, and eggs. Tables pres nt information on the preparation for freezing and method of packing for the different types of vegetables and fruits, along with recipes indicating amount of sugar needed for syrups.
M. B.

(2827) McClury, B. R. The Quality and Palatability of Beef after Storing at Sub-freezing Temperatures. Thesis, Iowa State College Lib., Ames, Iowa. 1941.

(2828) McCorkle, S. Quick Freezing and Chemurgic By-Products. Natl. Farm Chemurgic Council, Chemurg. Papers, No. 573, Columbus, Ohio, 1947. 7 pages. - Chiefly on the food freezing industry.

(2829) McCoy, D. C., Cook, S. V., and Hagner, G. A., "Study of Frozen Food Wrapping Materials." Refrig. Eng. 52, No. 12, 531-34, 584 (1946); Food Freezing 2, No. 12, 69-72, 93, 101 (1946); Frozen Food Ind. 3, No. 1, 12-5, 42 (1947). - Locker papers, laminates, films, and metal foils (about 30 in all) were tested for moisture-vapor transmission at 100° F., 90% rh, and also, in use, tested as wrappers for 4-pound beef roasts stored at 0° F. for a year and longer. A comprehensive method for rating food wrapping materials is presented. Data are reported on moisture-vapor transmission, weight loss for the beef roasts, and wrapper ratings. The vapor transmission values

measured at 100° F., 90% rh, are not reliable for general evaluation of wrappers for frozen foods. The importance of tight application of wrapper to meat was demonstrated.

R. A. 2, 109 (1947).

(2830) McCoy, D. C., "Home Freezers and Locker Plants." Canad. Dairy & Ice Cream J. 26, No. 3, 82 (1947). - A family of 5 persons, requiring 14 cu. ft. of frozen food storage space, can save about $239 on an initial investment for a home freezer and realize $35 more in savings on yearly operational expenses by combining the advantages of a commercial locker plant and a home freezer.

R. A. 2, 197 (1947).

(2831) McCoy, D. C., "Preparation of Food for the Freezer." Lkr. Plants & Frosted Foods 2, No. 1, 8-11, 41-2 (1947). - The freezing conditions, wrapping material, and storage temperature affect the storage life of frozen foods. At least 50% of the successful production of quality frozen foods is due to the use of suitable wrapping materials and their proper application to the product.

R. A. 2, 192-93 (1947).

(2832) McCoy, D. C., et al., "Freezer Wraps; Need for Better Locker Papers." Mod. Packaging 20, No. 7, 188-92 (1947).

(2833) McCracken, E. G., Sater, L. E., and Bailey, K. B., "Home Freezers During Power Outage." Refrig. Eng. 51, No. 2, 117-20, 152-3 (1946). - Results of test made to determine how long it takes food to rise to 32° F. and 40° F. in locations likely to warm most rapidly in home freezers; freezers used were of chest (top-opening) type varying in rated total storage capacity from 9 to 21 cu. ft.; in all cases, compressors were integral parts of freezer assembly.

E. I. 1946, 965.

(2834) McDaniel, R., "Distributor Looks to Improved Storage Facilities of Retailers for Increased Frozen Food Sales." South. Food Processing 1, No. 5, 24-5, 33 (1946).

(2835) McFarlan, A. I., "Nitrous Oxide as an Immersion Refrigerant for Freezing Foods." Frosted Food Field 3, No. 2, 2, 4 (1946). - Nitrous oxide apparently meets the requirements of an ideal immersion refrigerant better than any other known substance. It is odorless, nontoxic, relatively cheap, has high latent heat, low boiling point (-127° F.), and low displacement per hr. Among the problems encountered is the possibility of casehardening the product by too rapid freezing at about -120° F.

R. A. 1, 198-99 (1946).

(2836) McFarlane, V. H., "Behavior of Microorganisms in Fruit Juices and in Fruit Juice-Sucrose Solutions Stored at -17.8° C. (0° F.)." Food Research 7, No. 6, 509-18 (1942). - Sucrose is widely used as a preservative for frozen foods, but some believe it aids in preserving microbial viability. Therefore, suspensions of Escherichia coli, spores of Bacillus subtilis, and a torula species were made in unsweetened orange juice and in orange

juice-sucrose solutions (containing 20, 30, 40, and 50% soluble solids). Similarly, suspensions of torula species, Saccaromyces cerevisiae and Saccharomyces ellipsoideus Hansen were made in unsweetened loganberry juice, in loganberry juice-sucrose solutions, and in loganberry juice-sucrose solutions to which citric acid had been added so that the total acidity of each medium approximated that of the unsweetened juice. Ten ml. samples of each suspension were frozen and stored at -17.8° C. Greater microbial destruction occurred in the unsweetened juice than in the juice-sucrose media stored at -17.8° C. The total numbers of viable cells surviving several weeks of storage in the juice-sucrose media tended to vary as the concentrations of the sucrose. In some of the experimental series, the highest concentrations of the sucrose, 50 and 60%, did not always give the greatest protection; however, the limited experimental data did not permit conclusions regarding this observation.

B. J. A.

(2837) MacGillivray, J. H., et al. Food Values on a Pound, Acre, and Man-hour Basis for California Processed Vegetables. Calif. Agr. Expt. Sta., Lithographed Bull. No. 8563, 1943. 15 pages. - Canned, frozen, and dehydrated foods are ranked on their total nutritive value according to the food contribution they make per pound, acre, and input of labor.

C. A. 40, 2238 (1946).

(2838) McGregor, M. and Watts, B. Effect of Blanching, Freezing, and Canning on Vitamin Content of Snap Beans, Peas, Lima Beans, and Soybeans. Wash. St. Agr. Exp. Sta. National Coop. Project Prog. Notes No. 2, 1945.

(2839) McGregor, M. and Bedford, C. L., "Scalding Vegetables Necessary for Freezing." Quick Frozen Foods 9, No. 6, 130 (1947). - Blanching has been proven to be absolutely necessary for frozen foods. Vegetables frozen raw had poorer flavor, bad color and odor, less ascorbic acid, and were generally poor in quality.

B. J. A.

(2840) McGugin, F. W., "Can Oxidation be Eliminated?" Quick Frozen Foods 9, No. 2, 80-1 (1946). - The quantity of certain oxidizing enzymes in any fruit or fruit product can be determined readily and rapidly. These enzymes can be inactivated quantitatively in the fruit by the use of proper reagents. Fruit in which these enzymes have been inactivated will not oxidize on exposure to air over long periods. In order to obtain sufficient penetration by the inactivator, the fruit must be crushed or pulped. The entire oxidase system apparently can be destroyed in certain vegetable tissues, notably the apple and the potato.

C. A. 40, 7439 (1946).

(2841) McIntosh, J. Freezing Projects in Progress (1946) in United States and Canadian Laboratories. Frozen Food Foundation Publ., 1946. 23 pages. - A list of some 112 research agencies and their projects relating to the freezing preservation of foodstuffs.

R. A. 2, 109 (1947).

(2842) Mack, D., "Trend Toward Self-Service Calls for More Retailer Education." Food Freezing 1, 291 (1946). - Educating the retailer in handling of frozen foods.

(2843) McKenna, F. W., "Design Requirements for Efficient Fish-Freezing Plants." Food Freezing 2, No 1, 123-5 (1947). - Discussion of plant designed to freeze fillets for consumer demand and to freeze round fish for use in future canning operations. The design of the plant gives consideration to carrying peak loads with maximum efficiency in a warm climate. All compressor capacity may be concentrated on the freezers, which include brine, air blast, and still air types, in order to meet the demands of peak loads. The efficiency of the freezing operation is increased by precooling the fish in chilled water or mild salt brine prior to placing them in freezers.

R. A. 2, 82 (1947).

(2844) MacKinney, G., Quick Freezing of Foods in Liquid Nitrous Oxide; I. G. Farben at Hochst. U. S. Dept. of Commerce, Off. Pub. Board Report PB 1269, Washington, D. C., 1945. 9 pages.

(2845) MacKinney, Gordon, W.I.T.E.A.--Wissenschaftliche Technische Ausschuss. Off. Pub. Bd., Report, PB 3435, 1945. 4 pages. - Visits during July and August, 1945, and interviews with Professors Plank, Diemair, Bleyer, Serger, and Dr. Walther regarding this committee and its possible relation to government in the processing of foods for Army rations. Although the remains of the general headquarters in Berlin were not visited, it is not evident to the writer that food technologists made any outstanding contributions, either in advice or research, to government or industry. Some comment is made on food preservation, blanching, freezing storage, dehydration of vegetables, and the inspection service represented by the Staatliches Nahrungsmittel-Untersuchungsamt.

B. S. I. R. 1, 266-7 (1946).

(2846) MacKinney, G.,,"Immersion Freezing in Liquid Nitrous Oxide (at the plant of I. G. Farbenindustrie at Hochst near Frankfurt, Germany)." Food Indus. 18, 667-9, 816, 818, 820, 822 (1946). - Foods are immersed in liquid nitrous oxide at -90° C. under 1 atmosphere pressure, and frozen at the rate of 1 ton per hour. The nitrous oxide is nontoxic and evaporates, leaving no trace. After freezing, the compressed gas can be again liquified in a water container and reused. Blanching was not done in Germany, but should have been, in preparing vegetables and fruits for freezing. They were wrapped in plastic-dipped paper cartons and stacked on an iron container in freezer, for 20 minutes. The N_2O evaporated is led back to the gasometer and food removed for storage at -18° C. in a room refrigerated by ammonia. Products sold were well-received.

B. J. A.

(2847) Mackintosh, D. L., Hall, J. L., and Vail, G. E., "Some Observations Pertaining to the Tenderness of Meat." Proc. Am. Soc. Animal Production 29, 285-9 (1936).

(2848) McLean, Beth B., "Frozen Meat Cookery in the Home." Food N. & Views Bull. 30, 1-4 (Aug.-Sept.,1946). - Roasts, steaks, ground beef, liver, sweetbreads, some specialty items, and chops of beef, lamb, veal, and pork were frozen at -20° F. and stored at temperatures from -20 to 10° F. The samples were thawed by 3 different methods: during cooking, in a 45° F. refrigerator, and in a 70° F. room. The method of thawing had little or

no effect on the shrinkage, or on the flavor or juiciness of the cooked meat. The larger the piece of meat, the greater the difference in cooking time between the thawed and unthawed meat. A 2-in. frozen sirloin steak required 28 minutes longer than the thawed sirloin. Frozen roasts required about 10 minutes per lb. more cooking time than the thawed ones.

R. A. 2, 110 (1947).

(2849) MacPherson, A. R., "Tuna Clipper a Marine Refrigerator." Refrig. Eng. 53, 194 (1947). - A 132-ft. fishing boat, the Commander, is fully equipped with a mechanical refrigeration freezer and storage plant which will permit it to remain at sea until it has obtained a full cargo of tuna.

R. A. 2, 202 (1947).

(2850) Mahoney, C. H., Wallis, E. P., Hunter, H. A., and Scott, L. E., "Vitamin Content of Peas. Effect of Freezing, Canning, and Dehydration." Ind. Eng. Chem. 38, 654-7 (1946). - The losses of carotene, vitamin B_1, and C in the freezing, canning, and dehydration of peas depend on blanching time and length of storage. Very short blanching time (not greater than 1 minute at 190° F.) may lead to heavy losses of C in storage, due to failure to inactivate enzymes. Blanching times greater than 3 minutes gave slightly increased losses due to leaching. Canned peas (including liquor) retain approximately 58% of the original C and B_1 after 6 months' storage and approximately 45% after 9 months. The retention of C after storage for 6 months is 53% for frozen and 19% for dehydrated peas (dry weight basis). Dehydrated peas retain more C when stored in vacuum or in CO_2. The C contents of 8 varieties of fresh peas showed variations from 26.8 to 16.6 mg. per 100 g.

Br. A. BIII, 200 (Sept., (1946).

(2851) Makaroff, Alex, "Australia's Agar Industry." Food Ind. 18, No. 10, 1545-7 (1946). - Agar is extracted from dried sea-weed, Gracilaria confervoides, by a process of boiling, centrifuging, and filtering. The clear liquor is concentrated, allowed to gel, frozen, thawed, centrifuged, and dried. Freezing removes impurities and increases the gel strength 4-6 times. Three tons of dry weed yield one ton of agar. A summary is given of the uses of agar in the food field.

R. A. 2, 44 (1947).

(2852) Malcolmson, J. D., "Developments in Paper-board Packages." Amer. Box Maker 35, No. 2, 24 (1946). - Including use for frozen and dehydrated food.

(2853) Mann, L. B., Organizing a Refrigerated Food Locker Association. U. S. Farm Credit Admn. Coop. Res. and Serv. Div. Misc. Rpt. No. 20 (revised), 1945. 34 pages.

(2854) Mann, L. B., "Training Locker Employees." News for Farmer Coops. 13, No. 2, 8-9, 23 (1946).

(2855) Manning, W. G., "Truck Refrigeration." Can. Refrig. J. 12, No. 10, 22-26 (1946). - Construction of the various types of trucks for transporting frozen foods is described.

R. A. 2, 45 (1947).

(2856) Marcus, T., "There is a Need for Frozen Milk." Food Ind. 17, No. 3, 256 (1945).

(2857) Margolf, P., "Freezing Poultry." Everybody's Poultry Mag. 52, No. 2, 10-2, 31 (1947).

(2858) Margolf, P., "Freezers for the Poultry Farm." Everybody's Poultry Mag. 52, No. 4, 20, 22-3 (1947).

(2859) Marks, A. L. and Nilson, H. W., "Effect of Cooking on the Nutritive Value of the Protein of Cod." Com. Fisheries R. 8, No. 12, 1-6 (1947). - Preliminary experiments with rats showed that the nutritive value of the protein of either raw or cooked cod fillets was not affected by freezing. Therefore, quick frozen fillets in the frozen state were fed to the rats during the experiment. The cooked fillets were also frozen to permit feeding the rats from the same batch of cooked fish for a considerable period of time. The supplementary protein value of cod was not adversely affected by baking or broiling at 375° F. for 25 minutes, or by simmering at 185° F. for 20 minutes; nor was it affected by reheating the baked fillets after they had been refrigerated for 24 hours. Holding the baked fillets over water at 170° F. for 60 minutes after baking them at 375° F. for 25 minutes resulted in less satisfactory rat growth but the results were within the limits of variability of the experiment.

R. A. 2, 189-90 (1947).

(2860) Marquardt, J. C., "Frozen Curds Boost Cheese Production." Food Ind. 17, 501 (1945).

(2861) Marquis, H. H., "Good Frozen Food Promotion = Sales." Food Freezing 1, 340-1, 361, 396-7, 404-5, 434-5, 450 (1946). - This is a merchandising article analyzing the factors of good selling which come under the direct control of the retailer. The importance of the location of the frozen food department or store, and effective displays is stressed in order to increase sales.

A. S. C.

(2862) Marshall, R. E., "Plant Sanitation Conference." Fruit Prod. J. and Amer. Food Mfr. 25, 83-4, 91-2 (1945). - Includes rodent and insect control in canning and freezing plants.

(2863) Martin, E. F., "Electronic Device Defrosts Frozen Foods." Ice Cream Field 45, No. 5, 18, 20 (1945). - Barrels of frozen fruit which require 7 days for thawing at room temperature may be thawed in an hour with an electronic device. Less breakdown in the rapidly thawed products was reported. If desired, the products may be cooked in the same container by the device.

R. A. 1, 26-7 (1946).

(2864) Martin, J. W., "Florida's Place in the Frozen Food Industry." Comm. & Fin. Chr. 163, 402 (Jan. 24, 1946). - The author believes that Florida, because of its year-round food and fruit production, large winter tourist population, sea food industry, and chicken industry, is destined to

become one of the more important producers and consumers of frozen foods. "Velva fruit" and other frozen fruit products will eliminate much of the fruit waste which now occurs annually in Florida.

M. P.

(2865) Martin, L. S., "Present Status of the Frozen Food Industry." Ice Cream Field 45, No. 4, 70 (1945).

(2866) Martin, L. S., "Low Temperature Transportation." Butchers' Advocate 120, No. 2, 27-8 (1946). - Frozen foods.

(2867) Martin, L. S., "Major Problems of the Frozen Food Industry." Canning Tr. 69, No. 23, 7-9 (1946). - Quality control, transportation, and consumer education are the major problems facing the industry.

R. A. 2, 106 (1947).

(2868) Martin, S. C., "Insulation for Fruit and Vegetable Storage." Refrig. Serv. Engr. 12, No. 3, 23-8 (1946). - Resume of acceptable current practice for insulating cold storage rooms with corkboard, mineral wool board, cellular glass board. Recommended thicknesses of insulation for above freezing storage rooms are given.

R. A. 1, 141 (1946).

(2869) Masterman, N. K., "Frozen Foods Increasingly Popular with Consumer." Farm. Res. 12, No. 1, 4-5 (1946).

(2870) Masterman, N. K. and Winsor, K., "The Moisture Losses in Stored Frozen Meats Vary with Packaging Materials, Wrapping Method." Food Freezing 1, No. 4, 140-43 (1946). - When pork chops and ground beef were wrapped in locker paper or in cellophane, both with outer wrap of butcher's paper, and stored frozen for 6 months, there was no loss in weight in the cellophane packages in the butcher wrap or in the one-layer drugstore wrap, but chops in locker paper lost 0.88% in the butcher style and ground beef 3.74% in the drugstore wrap. The cellophane-wrapped meats presented a glazed fresh appearance, the locker-paper wrapped products were unglazed and dehydrated. The drug-store wrap produces a flatter package which is most desirable when cellophane is used, but the cost is about twice that of locker paper.

B. A. 20, 1821 (1946).

(2871) Masterman, N. K., "Meat Cutting for Locker Storage." Quick Frozen Foods 9, No. 2, 126-9 (1946). - Data on sources of meat, patron satisfaction, cutting preferences, and other patron reactions are given.

R. A. 2, 43 (1947)

(2872) Masterman, N. K. and Lee, F. A. The Home Freezing of Farm Products. N. Y. Agr. Col. (Cornell) Ext. Bulletin No. 611, revised, 1946. 64 pages. - Equipment, operating instructions, and wrapping materials are discussed for the quick freezing of meats, vegetables, and fruits. Tables indicate the varieties of fruits and vegetables found most successful for freezing. Directions are given for the preparation and actual freezing of these meat, dairy, and plant products.

M. B.

(2873) Masterman, N. K., "How to Freeze Broilers." Country Gent. 117, No. 5, 114-5 (1947). - Directions are given for killing and bleeding broilers in preparation for freezing. Feathers are removed (but the skin should be left on to prolong storage life), the broiler is eviscerated, and cut into pieces, then carefully wrapped so as to prevent drying during freezing and storage.

M. B.

(2874) Masurovsky, B. I., "The Peach Family of Fruits in Ice Cream." Ice Cream Trade J. 42, No. 3, 62, 88 (1946). - The composition of apricots, peaches, plums, and pineapples and their adaptability to ice cream making are discussed. The increasing use of these fruits in the frozen state for ice cream purposes is described.

R. A. 1, 146 (1946).

(2875) Matlack, M. B., Instructions on Processing for Community Frozen Food Locker Plants. U. S. D. A. Production & Marketing Admin. Misc. Pub. No. 588, 1946. 52 pages. - The discussion, tables, and illustrations cover all steps in the preparation of fruits, vegetables, meats, fish, poultry, and precooked foods for freezing. In addition to general information on selection of the product, pretreatments, packaging, freezing, thawing, and serving, individual discussion is given to 14 fruits and 17 vegetables.

R. A. 1, 213 (1946).

(2876) Mauney, R., "Bright Locker Future, Responsibilities Seen (Arkansas)." So. Refrig. J. 1, No. 8, 7, 16 (1946).

(2877) Maybury, R. H. and Shrader, J. H., "Abstracts of the Literature of Milk and its Products during 1946." J. Milk & Food Technol. 10, 67-91, 113 (1947).

(2878) Mazzola, L. C., "Potato Peeling Methods--Analyzed and Appraised." Food Indust. 18, No. 11, 1708-9, 1832-6, No. 12, 1874-6, 1980 (1946). - Temperature, humidity, and air circulation are critical factors in potato storage. Brine peeling gives poorest yields, abrasive peeling is better, steam batch process is better still, while high temperature lye method is best of all.

B. A. 21, 974 (1947).

(2879) Mazzola, L. C., "'Flash Freezing' of Foods." Food Indust. 18, No. 12, 1841-5, 1978-80 (1946). - Steam blanching prior to flash freezing causes less loss of vitamins and minerals than water blanching; oxidative changes are minimized. Precooling of blanched foods by vacuum reduces bacterial content. Avoiding time lag between blanching and freezing improves flavor, color, and ascorbic acid retention. Flash frozen foods are stored at temperatures usual for other frozen foods.

B. A. 21, 817 (1947).

(2880) Meek, G. W. and Greene, V. R. H., Jr., "An Evaluation of Food Freezing Methods." Food Freezing 2, No. 7, 471-5, 500-1 (1947); Refrig. Eng. 53, No. 5, 391-5, 454 (1947). - Nineteen of the most important freezing systems used during the last 25 years are listed, discussed, and illustra-

ted. Except for the nitrous oxide immersion method, they are all basically American developments. The 3 fundamental techniques are classified as: (1) immersion in liquid, gas, or air, (2) plate or surface contact, and (3) vacuum or self-refrigerated, with the peroentage of products frozen by each method recorded as 65%, 30%, and 5% respectively. The factors determining the relative suitability of a system, listed in the approximate order of their importance are: versatility to freeze, material handling costs, speed of freezing, initial cost, packaging and defrosting requirements, operating costs, and space requirements. Competition will play a large part in determining future trends in food freezing methods. The packer will have to concentrate on quality production of a good product. Prediction is made of the revival of the Birdseye or other pressure plate systems for small plants, and an increased use of the liquid immersion freezing system.

B. J. A.

(2881) Meek, G. W., "What Frozen Foods Can Do for the Power Industry." Quick Frozen Foods 9, No. 12, 60-1 (1947). - An immense demand for electric power is seen from the steadily increasing volume of commercial and home freezing being done today. An estimated freezing load of 40 billion pounds will require a minimum of 11 billion kilowatt hours of electricity.

B. J. A.

(2882) Meek, G. W., "Psyohrometry of Air Blast Food Freezing Systems." Refrig. Eng. 53, No. 4, 309-10 (1947). - A discussion of the relative merits of single- and multi-stage air blast freezing with regard to dehydration of frozen produot, and considering first costs and operating costs by each method. A theoretical mathematical analysis is made which indicates superiority of single-stage air blasting, but no conclusion is drawn either way.

M. P.

(2883) Mentley, G. L., "A New Industry Uses Advertising to Check Unsound Growth." South. Canner and Packer 7, No. 7, 20-22, 27 (1946). - Birdseye frozen food.

(2884) Mergentime, M., "Pack-Coding Avoids Grief." Food Indust. 18, No. 7, 1014-5, 1168-72 (1946). - To obtain oomplete quality control, code mark should be changed to indicate every change in processing and in quality or origin of raw materials; lot segregation applies equally to freezing, canning or other processing methods.

E. I. 1946, 433.

(2885) Mergentime, M. and Wiegand, E. H., "Low Temperature Characteristics of a Pea Proteinase." Fruit Prod. J. 26, No. 11, 72-80, 89-92 (1946). - A proteolytic enzyme extracted from peas was found to be similar to animal cathepsin, and the name "pisain" is suggested for it. Repeated freezing and thawing was found to produce a loss in its activity, but little loss occurred during freezer storage for 6 weeks. The time for 3.39% hydrolysis of casein at pH 6 at different temperatures was used as a measure of velocity constant in kinetic studies. It increased from 4317 minutes at 40° C. (104° F.) to 1630 minutes at -10° C. (14° F.). The kinetic studies in liquid systems indicated that the energy of activation is constant at 13,800 calories below 15° C. (59° F.) and at 10,300 calories above this temperature. Ice formation, however, exerts a marked inhibitory effect. At -5° C. (23° F.), ice formation permits only 50% of the action occurring in liq-

uid state at the same temperature and at -10° C. (14° F.) only 9.5% of the normal action in liquid state. Freezing at -17.8° C. (0° F.) resulted in no measurable proteolysis in 380 hours. Ice formation also changed the shape of the time-action curve by causing an earlier and a more rapid falling off of the rate. Temperature as low as -10° C. (14° F.) without ice formation, however, permitted considerable proteolysis. Very appreciable proteolysis can occur in unsoalded vegetables during freezer storage at -17° C. (1.4° F.), which may have much to do with their deterioration in quality.

R. A. 2, 95 (1947).

(2886) Metcalf, D., et al., "Food Packaging Studies; Significance of W. V. T. R. in Protecting Frozen Meat." Mod. Packaging 20, No. 1, 147-9 (1946). - The results and conclusions of a study made to determine the maximum water-vapor transmission rate (W. V. T. R.) that will protect stored meat against significant moisture losses when stored at 34° F., 8° F., -8° F., and -40° F. It was observed that the lower the temperature of storage, the less the requirement necessary for protection insofar as the W. V. T. R. of the packaging material is concerned. The conclusions of the study are: (1) moisture losses in frozen ground meat upon 6 months' storage at 34° F. or below indicate a direct relation between temperature and the water-vapor transmission rate of the protecting wrap; (2) a protective sheet with a water-vapor transmission rate of 1.3 (TAPPI)* or less is necessary to reduce to a practical minimum the moisture losses when meat is stored at temperatures from -40° F. to 34° F. for 6 months; and (3) approximately 0° F. seems to be the critical temperature of storage for ground meat from the standpoint of surface protection to reduce moisture loss to a minimum.

D. M. G.

(2887) Metcalfe, C. P., "A Modern Locker Plant." Refrigeration 83, No. 4, 3, 6-7 (1946).

(2888) Mettler, D. and Ostertag, A., "Quick Freezing Plant." Escher Wyss. News 14, 74-8 (1941). - Article discusses quick freezing method employed by Escher Wyss. Engineering Works, Limited, Zurich, Switzerland, and gives descriptive data on typical slaughterhouse installations equipped with "rotasco" refrigeration compressors.

E. I. 1945, 920.

(2889) Meyer, E. A., "Production vs. Consumption of Frozen Foods." Quick Frozen Foods 9, No. 9, XII-XIV (1947). - Production of frozen foods being high, distributors must plan carefully to meet demands and yet not have an overflow. Also, many types of competition must be equalled and surpassed to give the proper scope of trade. To justify this, it must be remembered that high quality is an absolute necessity.

B. J. A.

(2890) Meyer, E. A., "Frozen Food Future Depends upon Quality of Products." West. Canner & Packer 39, No. 9, 73, 75, 77 (1947). - In order to put the frozen foods industry on a sound basis careful planning must first be done, both as to the amount and the varieties of foods to be frozen. Next, re-

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* Technical Assn. of the Pulp and Paper Industry procedure. Values given are grams water vapor transmitted per sq. meter per 24 hrs. at 73° F., 50% relative humidity.

search and development will yield more efficient plant operation. High quality must always be maintainod for the good of the whole industry as well as the consuming public.

B. J. A.

(2891) Miller, A. E., "Quick Frozen Products and Cold Storage Industry." Inst. Refrig. Proc. 42, 139-49, 150-7 (1945-6). - Comparisons between progress of quick freezing in United States and Great Britain; quantities in which quick frozen commodities will be offered for storage in public cold stores, facilities to be provided for safe storage, and storage rates, are studied.

E. I. 1946, 231.

(2892) Miller, A. E., "Quick-frozen Products and the Cold Storage Industry. A Symposium." Food (London) 15, 121-2 (1946).

(2893) Miller, A. E., "Quick Frozen Foods." Food Mfr. 21, No. 9, 388-90, 397 (1946). - The fog, multiplate, and air blast types of freezers are discussed.

R. A. 2, 39 (1947).

(2894) Miller, E. L. and Vail, G. E., "Angel Food Cakes Made from Fresh and Frozen Egg-whites." Cereal Chem. 20, 528-35 (1943). - Temperatures of 21° C. for beating the egg-white and of 204° C. for 35 minutes or 218° C. for 30 minutes for baking produced the best cakes from fresh, thin-frozen, and thick-frozen egg-whites. Thick-frozen egg-white produced less desirable cakes.

Br. A. BIII, 28 (Feb., 1944).

(2895) Miller, H. V., "Opportunities in Frozen Foods in Tennessee." Tenn. Planner 5, No. 3, 71-8 (1945). - Many more locker plants are needed, especially in the eastern section of the state. Basic chara teristics of good operation are listed. Estimated statements of costs and income are given.

R. A. 1, 38 (1946).

(2896) Miller, Mrs. H. W., Jr., "Frozen Apples." Va. Fruit 34, No. 5, 10 (1946).

(2897) Miller, I. C., "Existing Cold Storage Facilities for Quick Frozen Foods." Food Ind. 10, 438-9, 469, 501, 504, 523 (1938).

(2898) Miller, J. I., Blakeslee, L. H., and Gortner, W. A., "The Effect of Length of Freezing." Lkr. Operator 8, No. 7, 26, 68 (1947). - Cooked fresh steaks from beef short loins aged 9, 16, and 23 days in a 33-34° F. room were significantly more tender than those aged 2 days. The greatest improvement in tenderness was during the 9-day period. Lower grades were improved more than higher grades by aging, but losses in lower grades made aging longer than 9 days impractical. Expressible juice decreased with length of aging period without a similar decrease in total moisture. Freezing at -8° F. and storage at 0° F. increased tenderness with the greatest improvement shown in steaks aged for shorter periods of time. Freezing

increased the tenderness of steaks aged 2 days to approximately equal that of fresh beef steaks aged 9 days. Improvement in tenderness of the cooked product due to aging is generally so little that beef should be frozen well before significant aging losses occur.

R. A. 2, 192 (1947).

(2899) Miller, P. C., "Tentative United States Standards for Grades of Fresh Frozen Vegetables and Fruits." Frozen Food Ind. 2, No. 12, 16-9 (1946). - A brief review of the current requirements published by the USDA.

R. A. 2, 121 (1947).

(2900) Miller, R. E., "Quick Freezing Methods and Equipment." Lkr. Plants & Frosted Foods 1, No. 4, 15, 17, 38-42 (1946); Quick Frozen Foods 8, No. 10, 88-9, 102 (1946); South. Food Processing 1, No. 3, 27-30; No. 4, 18-20, 28-29 (1946). - A continuous process for freezing foodstuffs in a high velocity air stream with a vertical tray type freezer is described. The cycle of automatic operation includes (1) feeding the product to the trays, (2) distributing the product over the trays, (3) passing the trays upward through the freezer column, (4) dumping the frozen products, and (5) returning the empty trays to the starting position.

R. A. 2, 114 (1947).

(2901) Miller, R. N., Practical Home Zero Storage. Chemurgic Reprint Series, No. 10, 1944. 4 pages. - Successful farm freezers must be of adequate capacity, low cost, simple construction, low up-keep and depreciation and operate on available electric current. Eight drawings of various phases of home freezer construction are included.

M. P.

(2902) Miller, R. N., "Farmers Need Big Freezers; an Expert Gives Pointers on Selecting the Size and Kind that Will Serve your Farm Needs Best." Turkey World 22, No. 5, 20, 62-5, 68 (1947).

(2903) Mills, P. A., "Report on Sampling Cold-pack Fruit." J. Assn. Official Agr. Chem. 28, 518-25 (1945). - Barrels of straight strawberries, 3-1 strawberries, straight red raspberries, straight Evergreen blackberries, and straight Evergreen blackberries containing 10% added water were sampled during filling and the samples filled into quart jars (42 per barrel). Each sample was divided into several portions and subjected to treatment designed to approximate conditions in the freezing barrel, and then analyzed. Each barrel was also sampled from both ends (top and bottom) with a 1-in. trier 40 in. long that could extend diagonally through the length of the barrel, and also from both top and bottom with a 2-inch trier 26 inches long which lacked about 4 inches of extending the full depth of the barrel. The results of analysis indicate that a sample taken diagonally through the length of the barrel from the bottom represents the package quite well. Juicing of the fruit during packing results in a condition where the proportion of juice to fruit increases toward the bottom of the barrel, and it is impossible to obtain a representative sample from the top unless the trier is bored completely through to the bottom of the barrel. If the package is sampled from the bottom, however, the air space left at the top furnishes a space which insures complete sampling. The data do not include advantages of diagonal sampling over cores taken straight through; neither can any conclusions be drawn as to the minimum number of cores that

should be taken. Mills is of the opinion that not less than 3 samples should be taken with the 1-inch trier in order to obtain a sample large enough for convenient analysis. Samples taken with the 2-inch trier did not prove representative, because much of the barrel was represented twice. Cores 26 inches long taken from each end result in a sample of 4 inches from each end and a duplicate of the 18 inches in the center. A more representative sample could be obtained by boring only halfway from each end. Study of the analyses of individual cores indicated that one core halfway through the barrel from each end, midway between the side of the barrel and its center and from opposite sides, should result in a representative sample. This method should be especially effective on sugar packs, where the material is not frozen solid, because the core from the top would not extend to the syrup layer, and the core from the bottom would contain all the syrup trapped by a plug of fruit. The experiment with blackberries in which 2 barrels were packed, one straight and one with 10% added water, showed, on comparison of the analyses of the cores taken diagonally through the barrels from the bottom, an average lowering of the various constituents of 9.91%, and when compared to the sample of fruit stored with the barrel, a lowering of 9.13% (exoluding P_2O_5 which showed an increase in the barrels). In this experiment there was no evidence of unequal freezing from one side to the other or toward the center. All of the barrels appeared to have been frozen top up. It is believed that diagonal sampling or sampling from opposite sides from both ends of the barrel will compensate for any variations encountered.

C. A. 40, 649 (1946).

(2904) Mitchell, M., "What Homemakers Want in Postwar Refrigeration." Refrig. Eng. 49, 285-6 (1945). - Criticisms of the prewar refrigerators are given with suggestions for the new domestic refrigerator and home freezer. Practical reasons are given for such features as automatic defrosting, elimination of covered containers, adjustable shelves, butter compartment, and more storage space in flat-topped cabinets. The home freezer should be large enough for the class of user with automatic temperature control and defrosting. Adjustable drawers or shelves with front opening doors would provide accessibility as well as a flat top for work space with the possibility of assembly into the complete kitchen unit. Surfaces more easily cleaned and no objectionable sweating are also very desirable. The advantages of better refrigerated grocers' cases for fresh fruits and vegetables are briefly discussed.

R. A. 1, 25-6 (1946).

(2905) Mitchell, T., "Capacity Control for Refrigerating Machines." Power 89, No. 6, 399 (1945). - Description of various methods of regulating refrigerating compressor capacity to fit variable load conditions.

E. I. 1945, 918.

(2906) Mitchell, T., "Community Refrigeration Centers." Southern Power & Industry 63, No. 8, 62-3, 71 (1945). - Many Southern plants will be hard pressed to maintain wartime gains in ice and refrigeration business; some suggestions are set forth for installation and management of refrigerated food lockers.

E. I. 1945, 234.

(2907) Mocine, D., "Frozen Poultry; a Challenge to the Industry." Poultry Supply Dealer 23, No. 11, 16, 38-39 (1946).

(2908) Monsen, K. J., "Freezing of Food, and Locker Plants in Connection with Creameries in Norway." Meieriposten 36, 37-43 (1947).

(2909) Monvoisin, A., "Freezing Broken Eggs." Int. Rev. Sci. & Prac. Agr. Intl. Insti. Agr., Rome, Italy 12, 916-17 (1921?).

(2910) Moran, T., "The Storage of Frozen Poultry." Dept. Sci. Ind. Res. Brit. Rept. Food Invest. Bd., 43-4 (1935-36). - Aluminum foil, covered on both sides with waxed paper, was tested in order to determine whether it would reduce or prevent "store-burn" of frozen poultry. This method of storing birds allowed only 0.34 per cent loss in weight in five months' storage at -10° C., and yielded an excellent product.

B. J. A.

(2911) Morgan, E. G., "Refrigeration for Packing House." Nat. Engr. 50, No. 8, 614-19 (1946). - Design and operation of packing house refrigerating systems; recent developments; relative importance of temperature and humidity in chilling and freezing of meat; how to determine refrigerating load for different classes of meat and for different chilling and freezing operations; how to maintain proper humidity in cooling and freezing rooms; preventing excessive frost formation on cooling coils.

E. I. 1946, 964.

(2912) Morrison, C. B., "The Frozen Egg Industry in China." Ice & Refrig. 91, No. 2, 133-34 (1936). - An extensive frozen egg industry exists in Shanghai, where large-scale methods of handling, inspecting, freezing, and processing eggs has been developed. Exports are made, using modern refrigeration equipment.

B. J. A.

(2913) Morrison, W. H., "Locker Plant Builds Business by Providing Customers with new Services." Ice & Refrig. 112, No. 5, 64, 66, 68 (1947).

(2914) Morrison, W. L., "Problems Facing Cabinet Distributors." Quick Frozen Foods 8, No. 5, 96, 98 (1945).

(2915) Morrow, A., "Appraisal of Frozen-Foods Industry; Various Marketing Obstacles." J. Retailing 21, No. 10, 105-12 (1945).

(2916) Moyer, J. C., "Electronics in the Service of Food Technology." Canner 101, No. 24,14-5 (1945); Farm Res. 11, No. 4, 1-3 (1945). - Blanching of vegetables by electronic heating results in only minor losses of vitamins as compared with boiling water or steam processes.

B. J. A.

(2917) Moyer, J. C. and Stotz, E., "The Application of Electronics to Blanching." Canner 102, No. 5, 63, 148 (1946). - The advantage of blanching (by the use of electronic apparatus) food before quick-freezing, is that no water-soluble vitamins are lost by this process. The food is prepared as usual, packed into the cartons, then processed in an electronic oven.

M. B.

(2918) Moyer, J. C. and Stotz, E., "The Freeze-Drying of Foods--a Look into the Future." Farm Res. 12, No. 1, 16-7 (1946); Frozen Food Ind. 2, No. 9, 16, 43-4 (1946). - Very good results were reported from drying of frozen foods by sublimation under 29 inches Hg vacuum, similar to the methods used in the preparation of serums, vaccines, blood plasma, and penicillin. Rapid evaporation prevents rapid thawing of the product during drying. Foods dried at low temperature retain a relatively high degree of their original color, flavor, and texture after rehydration; lose from 2-10% of vitamin C, as compared with 20-30% by heat drying; and rehydrate in about 10% of the time required by heat-dried products.

R. A. 2, 39 (1947).

(2919) Moyer, J. C., "Blanching by Electronics Involves New Principles." Food Packer 27, No. 2, 35-6 (1946). - Dielectric heating of vegetables at a frequency of 7 to 10 megacycles caused arcing which burned the food. At 28 to 29 megacycles this arcing was somewhat lessened, while at 150 megacycles little or no arcing was encountered. Loss of heat by conduction was minimized by enclosing the electrodes in an oven. Preliminary results showed that when shredded cabbage was heated electronically, in steam, and in boiling water to the point where catalase was inactivated, the losses of vitamin C were 30 to 40% in the steam and water processes and only 3% during electronic blanching.

C. A. 40, 5164 (1946).

(2920) Moyer, J. C., et al., "Freeze-Drying Holds Promise." Food Packer 27, No. 4, 42-4 (1946). - Dehydration of frozen vegetables under a high vacuum (sublimation) resulted in 2-10% loss of ascorbic acid, whereas ordinary dehydration resulted in 20-30% losses.

C. A. 40, 6186 (1946).

(2921) Mundee, C. R. and Porcher, F. C., "Quick Frozen Foods." Foodstuffs Round the World, 1-12 (1938).

(2922) Myles, W. H., et al. Certain Aspects of the German Fishing Industry. (BIOS Final Rept. 493, Item 22.). Off. Pub. Bd., Report, PB 31237, 1946. 77 pages. - This report presents an interesting survey of German fish preservation methods, processing machinery, and quick freezing in Norway. Subjects discussed are: (1) fish processing machinery (interview with Herr Bauder, Nordischer Maschinenbau, Lubeck); (2) quick freezing and cold storage of fish by the multi-plate froster (Birdseye), the "Z" brine-fog process of Zarotschenzeff, the air blast system, and the contact system of freezing on pipes combined with air blast employed by Dr. Schlienz on the trawler Weser; (3) smoke curing of fish; (4) the preservation of fish by canning and related processes; (5) "Wiking Eiweiss" (a protein product manufactured from fish); (6) Institut für Fischverwertung der Reichsanstalt für Fischerei. An account of the activities of the three large German fish freezing groups in Norway during the war in the purchase of raw material, processing, storage, transport, and sale of the frozen fish, is given in an article entitled "German freezing business in Norway", received from Herr Lohmann of Vereinigte Tiefkuhlegesellschaft Lohmann and Co., K. G., Hamburg. This article, together with ground plan of Lohmann's works in Svolaer and drawings of the special box made for Lohmann of special aluminum alloy for holding fillets while being frozen by the "Z" freezer, and of the air blast freezer used by the Andersen-Reemtsma group, and notes on the costs of the Norwegian freezing undertakings of Nordsee A. G. at Bodo and Trondheim are presented in

appendices. Also included in appendices are a chemical analysis of "Wiking Eiweiss" from the Research Institute for the Fish Industry, Altona/Elbe, an article entitled "The wonder raw material" setting forth the properties and uses of the product, and recipes for the baking trade.

B. S. I. R. 2, 501 (1946).

(2923) Nash, B., Developing Marketable Products and their Packagings. New York: McGraw-Hill, 1945. 404 pages. - Contains reference to canned, frozen, and dehydrated foods, for which the index should be consulted.

(2924) Nason, E. H., "Recent Trends in Frozen Foods." Amer. Dietetic Assn. J. 23, 318-321 (1947). - A review.

R. A. 2, 192 (1947).

(2925) Nerenberg, G. A., "Freezing Milk in Brick Form." Ice Cream Trade J. 41, No. 6, 26-7, 66-7 (1945). - Any plant having a vacuum pan and ice cream facilities can freeze concentrated milk in brick form. A good quality fluid milk is (1) pasteurized at 180° F. for 15 minutes, (2) condensed to one third its original volume by removing the water in a vacuum pan, (3) homogenized at 3000-3500 lb. per sq. in. pressure, (4) cooled, (5) partially frozen in an ice cream freezer, and (6) stored in square or rectangular boxes at -10° F. for further freezing. During frozen storage, most bacteria remain dormant, but some are destroyed. The most satisfactory way of defrosting and reconstituting the product is to place the solidly frozen block of milk into the proper volume of hot water, 180° F., and allow it to melt undisturbed. It is believed that frozen concentrated milk will eventually be cheaper than fluid milk; may partially replace evaporated milk because of the improved flavor; and will be used by the Army and Navy to good advantage.

R. A. 1, 161 (1946).

(2926) Neubert, A. M. and Veldhuis, M. K., "Cleaning Vined Canning Peas by Froth Flotation." Food Indust. 17, No. 5, 484-7, 608-16 (1945). - Process removes troublesome materials saving labor on inspection line; air bubbles can be attached selectively to materials to float them off; principles might be applied in other fields.

E. I. 1945, 172.

(2927) Newall, A. P., "Deep-Freezing (As Alternative to Pasteurization of Milk)." Dairyman 63, 65, 67 (Feb., 1946).

(2928) Newton, W. and Jones, W., "The Fluorescence of Frozen Potato Tuber and Apple Fruit Tissue Under Ultraviolet Light." Can. J. Res., Sect. C. 23, No. 4, 76-8 (1945). - Freshly cut sections of frozen potato tubers and apple fruit tissue exhibited a brilliant fluorescence when examined in a dark room under an ultraviolet (Stroblite) lamp. Many other types of plant tissue did not show this activity when frozen, and potato and apple tissue showed it only after freezing. It disappeared from the apple tissue upon thawing but remained in the potato tissue, and may be used as a diagostic method for determining if potatoes have ever been frozen. Acetone extracts of both normal and frozen potato tuber tissue were fluorescent, but similar extracts of both frozen and normal apple fruit were not.

R. A. 2, 36 (1947).

(2929) Nicholas, J. E. and Guerrant, N. B., "Problems Concerning Frozen Foods." Refrig. Eng. 50, No. 5, 417-19, 466-68 (1945). - Discussion of

problems involved in selecting, preparing, packaging, and processing which affect quality and nutritive value of frozen foods; because of ever increasing popularity of food freezing, authors believe that sound evaluation of freezing techniques should be goal of future research efforts. From Paper No. 1281, Journal Series, Pennsylvania Agricultural Experiment Station.

E. I. 1946, 963-64.

(2930) Nicholas, J. E. Freezing Rates of Foods, in Locker Plants, Farm Freezers, and Domestic Frozen Food Cabinets. Pa. State Coll. Agr. Expt. Sta. Bull. No. 471, 1945. 20 pages. - Rates of freezing foods in farm and domestic type storage cabinets and in locker plants, employing single-plate and air blast methods of freezing vegetables, poultry, and meats, are reported. From 1 1/4 - 2 hours were required to precool the products, from 2-12 hours to freeze, and a short time to subcool. The size of package and number of layers of wrapping material affected the rate of freezing greatly and caused the time required for subcooling to range from 8-24 hours. Freezing in locker plants was slightly faster on metal plates at -22° F. than in a -12° F. air blast.

R. A. 1, 94 (1946).

(2931) Nicholas, J. E., "Freezing Rates of Foods in Locker Plant with Direct Air Blast." Agric. Eng. 27, No. 5, 223-7 (1946). - Freezing rate studies were conducted, under controlled conditions, on packaged (rectangular retail sizes) snap beans, lima beans, broccoli, brussels sprouts, cauliflower, spinach, diced carrots, and cubed pineapple. For a given weight of packaged product, the most important factors controlling the rate of heat transfer are (1) type of container, (2) shape, (3) number of layers of outside wrapping material, and (4) arrangement of packages. Temperature-time graphs of the rates of cooling and freezing are given. The factor of air motion and direction must be brought under control before any standard can be established for measurement of air-blast efficiency in freezing packaged foods.

R. A. 1, 214 (1946).

(2932) Nicholas, J. E., et al., "Moisture Losses of Vegetables during Steaming, Quick Freezing, and Packaging." Agric. Eng. 27, No. 6, 263-8 (1946) - Study was made to determine whether moisture losses in foods that have been quick frozen before packaging are sufficiently small to recommend this method of processing; it is believed that foods thus frozen may retain original quality for longer storage period than foods packaged before freezing. Before American Society of Agricultural Engineers. Paper Number 1325, J Series, Pennsylvania Agricultural Experiment Station.

E. I. 1946, 963.

(2933) Nicholas, J. E., "To Freeze Tomatoes and Tomato Juice." Food Freezing 1, 86-7 (1946). - Tomatoes were frozen whole, sliced, and diced. Best results were obtained by freezing slices on metal plate at -20 to -40° F., glazing by dipping in water, then packaging. Whole tomatoes handled in this manner were less crisp on thawing than slices or dices. Tomato juice was prepared as for canning but frozen instead.

R. A. 1, 81 (1946).

(2934) Nicholas, J. E., "Bulk Freezing for Commercial Use." Food Freezing 1, 130-2 (1946). - On being blanched, vegetables increase in moisture from 1-4%, which in turn is lost during blast freezing in bulk. With air blast

at 600-800 ft. per min., at temperature of about -14° F., peas froze on trays in bulk in about 7 minutes, while snap beans froze in about 16 minutes.

R. A. 1, 153 (1946).

(2935) Nicholas, J. E., "Report on Pork Shoulders Frozen and Stored for Four Years at 0° F." Food Freezing 2, No. 12, 90-1 (1946). - Samples of pork shoulder wrapped in cellophane lost 0.71-1.65% in weight during 4 years storage, while those wrapped in locker paper lost 10.4-11.15%. The former were acceptable for cooking and eating, while the latter were discolored and rancid. The lean portions were in much better condition than the fat portions. Lean pork, properly wrapped, may be stored longer than 1 year at 0° F.

R. A. 2, 99-100 (1947).

(2936) Nicholas, John E. Research on Frozen Foods. Penna. Agr. Expt. Sta. Paper No. 1321, 1946. 8 pages; Penna. State Hort. Assoc. Proc. 87, 49-56 (1946). - Data for peas, beans, and meat are given, illustrating the reduction in temperature during precooling, the nearly constant temperature during freezing, and reduction to the temperature of the freezer room. Bulk and type of package influence the time of freezing, and this influences the size of the crystals within the cells. The greater rapidity with which unpackaged food can be frozen will probably lead to packaging after freezing in commercial operations. Promising results were obtained in freezing tomato juice. Work is being done with freezing complete meals, but thawing food with different component parts needs further work.

B. A. 20, 1621 (1946).

(2937) Nicholas, J. E., Ruth, D., and Swanson, M. E., "Crystallization Behavior in the Freezing of Fresh Fruit Pies." Frozen Food Ind. 3, No. 7, 8-9, 31-34 (1947). - Cooling and freezing rates were recorded for blueberry, raspberry, and cherry pie fillings, the fruits in natural and cooked states, the pie dough, and the entire pies. Thermocouples constructed of copper-constantan wire were used to obtain potentiometric readings during the freezing. Results indicated that crystallization of all baked pie fillings was complete in a relatively short time, requiring approximately five minutes. In the freezing of fresh fruit pies, the cooling curves show a rise in temperature from the arrest points which is presumably due to the crystallization of sugars or other dissolved substances. When soluble materials come out of solution by crystallization, the process is exothermic as indicated by the rise in temperature.

M. B.

(2938) Nielsen, J. P., Campbell, H., Bohart, C. S., and Masure, M. P., "Degree of Maturity Influences the Quality of Frozen Peas. I-II." Food Ind. 19, No. 3, 305-8; No. 4, 479-82, 580 (1947). - Investigations of the relation of maturity of fresh peas to composition and quality after freezing were carried out with the objective of developing measures of maturity and texture. The peas were harvested at increasing stages of maturity, shelled, washed, size graded, blanched for 90 seconds in boiling water, cooled for 3 minutes in running water, frozen on trays in moving air at -10° F., packaged, and stored for 5 months prior to analysis. Flavor of the cooked peas and texture of cotyledons were evaluated by 12 experienced judges. The starch content of the frozen peas increased linearly with increase in maturity as measured by the tenderometer, the total sugar content tended to rise

and then fall with maturity, the protein content increased in curvilinear manner with maturity, and the fat content increased rapidly at early stages of maturity and then leveled off. The total solids content of 5 varieties of peas increased linearly with maturity of raw peas as determined by the tenderometer, and there was a high and significant correlation between maturity and solids content. Total solids as well as starch content can be used equally well as evidence of cotyledon texture in frozen peas. Although the percentage of defrosted peas with skins removed sinking in 13 and 16% salt solutions increased with increase in maturity, for a given stage of maturity there was a range in the percentage of peas sinking. Maturity was found to influence development of abnormal flavors in frozen peas; off-flavor decreased with maturity followed by a somewhat slower increase. Skin texture was observed to be objectionable in peas when their starch content reached 2.9%, while the cotyledon texture passed the stage of fancy quality at 4.6%.

R. A. 2, 177-8 (1947).

(2939) Nielson, F. A. and Garnatz, G. F., "Observations on Death Rates for Bacterial Flora of Frozen Egg Products." Proc. 1st Food Conf. Inst. Food Tech. 1, 289-97 (1940).

(2940) Nissen, H. J., "Refrigerated Warehouses and the Frozen Food Industry-Mutual Benefits of Co-operation." Ice and Refrig. 112, No. 5, 57-8 (1947).

(2941) Nissen, H. J., "Warehousemen and Frozen Packers Must Work Together." West. Canner and Packer 39, No. 5, 83 (1947).

(2942) Nordlinger, E. W., "Frozen Food Packers Count Their Assets; National Convention Takes Steps to Improve Industry Position." Food Packer 28, No. 5, 27-29 (1947).

(2943) Notteghem, M., "Use of Cold in the Fruit Industry." Assoc. Ing. Ind. Agric., Conf., 17-18 (1945). - Distinction is made between chilling (above freezing point) for fruits intended for use in their normal condition, and freezing (for example, at -8° C. to -30° C., or in storage at -18° C. to -20° C.). Conservation is also influenced by atmospheric relative humidity, preferably of 80-90, and requires circulation of air at a rate varying with the purpose desired; occasional admission of fresh air is necessary or, in some methods, use is made of air of reduced O_2 content or containing antiseptics. The use of cold in the manufacture and conservation of fruit juices is noted.

Br. A. BIII, 259 (Dec., 1946).

(2944) Novick, Jules, Fruits and Vegetables. Vol. I. Part V. Quick-frozen Fruits and Vegetables. U. S. Off. Pub. Bd. Report No. 40728, 1946. 23 pages. - This manual of the U. S. Quartermaster Food and Container Institute for the Armed Services is in five parts. Part I is by Jules Novick and Walter S. Richert and deals with fresh and dehydrated fruits. Chapter 1 covers variety, diseases and insect pests, growing seasons, markets, trade terms, grades, inspection, packaging, and prices of various fresh fruits as a guide to Army personnel in procurement. Chapter 2 covers dried fruits, including production procedures applicable to individual fruits, principles of dehydration including dehydrator design and operation, and quality con-

siderations including grading, food value, reconstitution, storage, sanitation, etc., and a bibliography. Part II deals with fresh and dehydrated vegetables covering the same types of information as in Part One. Part III covers Irish potatoes and includes information on culture, marketing, storage, damage, nutritive value, preparation, conservation in cooking, and recipes. Part IV, by Martha W. Miller, covers varieties, importance as food, culture, insects, diseases and injuries, grading, storage, marketing, and transportation of onions. Part V is entitled quick-frozen fruits and vegetables and discusses theory of quick freezing, commercial processes, quick freezing of vegetables and fruits, including varieties adapted to freezing and preparation procedures, and packaging, storage, transportation, mass preparation, nutrition, and quality control of frozen products. Parts II, III, and V are by Jules Novick.

B. S. I. R. 3, 326 (1947).

(2945) Nutting, A., "Using Air Filters in Food Processing Plants." Food Ind. 19, No. 1, 37-9 (1947). - New methods of controlling air-borne microorganisms in food processing plants have been introduced. Ultraviolet radiation is effective against many bacteria but is unsatisfactory in some respects. Its effectiveness depends upon intensity of radiation, wave length, and duration of contact. Chemical germicides are at present considered practical only for applications involving air for breathing. Electronic filtration is very effective in removing microorganisms and other suspended material from air by electrical attraction.

R. A. 2, 84 (1947).

(2946) Oberhelman, L. Freezing Farm Foods. Purdue Univ. Agric. Ext. Bull. No. 308, 1946. 23 pages.

(2947) O'Brien, D., "Game Laws vs. Food Freezers." Outdoor Life 96, No. 6, 27, 138-9 (1945); Quick Frozen Foods 8, No. 5, 131, 134 (1945). - Time limits on possession of game killed in season should be eliminated in order to make full use of food freezers. A table showing how long game may be kept under present state laws is given.

R. A. 1, 224 (1946).

(2948) Obright, R., "American Frigid-Dough, Inc., Launches Promotional Program." Baker's Weekly 132, No. 9, 36-38, 58 (1946).

(2949) Oderkirk, A. D. and Ferguson, F. E., "Frozen Birds and Broken Eggs." Country Gentleman 108, No. 3, 16, 88 (1938). - Prooess for freezing poultry begins with the electrioal killing of the bird, removing feathers with wax, drawing,and wrapping in oellophane and cartons. If the "Z" process is used, the carcass is frozen in a fine brine spray and coated with a film of ioe before packing. In the Birdseye process, the packaged birds are brought into contact with freezing plates at temperatures of around 30 degrees below zero. Since more than half of the eggs laid in one year are laid during the months of April, May, and June, new methods of drying and freezing eggs for year-round use are being sought. Eggs may be frozen whole or broken out of the shell and frozen in the mixed state or as separate whites and yolks.

M. B.

(2950) Ogden, F. F. and White, J. F., "The Use of Silica Aerogel as a Thermal Insulation." Refrig. Eng. 52, No. 5, 411-14 (1946). - Silioa aerogel is a product of dehydrating silica jelly in such a manner that the liquid phase is replaced by air without destroying the gel struoture. In this respect, it differs from silioa gel widely used for dehydration, and for the same reason finds extensive use as thermal insulation. It is a voluminous solid having a density of about 7 pounds per cu. ft., approximately 94 per cent of its volume being air. It will not piok up appreciable amounts of H_2O from the air. Nevertheless, its insulating qualities are destroyed by liquid H_2O. Natural settling equilibrium, about 2 per oent reduction in volume, is reached in 5 hours. Aerogel offers no fire hazard, nor is it silicotic. With these properties, it offers opportunity for changes in insulating design and practice. It has been used with marked improvement in refrigerators, freezing cabinets, tank trucks, and storage tanks. Although not available commercially, an improved form of aerogel has been developed weighing 3 1/2 to 4 pounds per ou. ft.

F. I. 19, 564, 566 (1947).

(2951) Oldham, J. and Schultz, F. W., "Effect of Different Levels of Vitamin B_1 and Fe on Retention of Fe and Fat Content of Normal Young Rats." J. Nutrition 19, 694 (1940). - Quick-freezing may increase somewhat the availability of iron.

B. J. A.

(2952) Onsdorff, T., "Quality Grading of Frozen Foods." Fruit Prod. J. 26, 237-8 (1947).

(2953) Orr, N., "Locker Plant Operators have many Troubles." Food Indus. 19, 760-2 (1947).

(2954) Osterhaug, K. L. and Bucher, D. L., "Precooked Frozen Fish Preparations." Food Packer 26, No. 9, 42-4 (1945). - Experimental procedure for freezing precooked fish has been to prepare the food as though it were to be served immediately, cool it quickly, pack, and freeze. Recipes are given for preparing fish creamed in cheese sauce, fish chowder, fish a la king, fish and rice, fish in creole sauce, fish hash, and clam fritters.
M. B.

(2955) Ottenheimer, R. E., "Streamline Equipment for 'Plus-Sales'." Frosted Food Field 4, No. 2, 20-1 (1947). - Frozen food equipment.

(2956) Otto, M. L. and Phelps, E. B. The Looker Plant Industry in Kansas. Kans. Agr. Expt. Sta. Agr. Econ. Rpt. No. 29, 1946. 9 pages.

(2957) Ovson, L. D., "Better Frozen Eggs for the Institutional and Manufacturing Industries." Quick Frozen Foods 1, No. 3, 15-8, 40 (1938).

(2958) Ovson, L. D., "Modern Egg Breaking (for Freezing)." U. S. Egg and Poultry Mag. 51, 492-94 (1945).

(2959) Paul, P., "Preparation of Purees for Locker Freezing." Frosted Food Field 4, No. 1, 1, 18-19 (1947). - Fruit to be used in purees is cooked a short while to preserve color and flavor, put through a sieve or food chopper, mixed with a small amount of sugar, packaged, and frozen. A slight loss of vitamin C occurs during the preparation of the puree, but little if any during freezing and frozen storage. Recipes are given for the preparation of sour cherries, berries, plums, peaches, grapes, rhubarb, strawberries, and tomatoes for freezing.

M. B.

(2960) Pavlovski, W. L., "Frozen Foods Have a Great Future." U. S. Egg and Poultry Mag. 53, No. 5, 24-5 (1947).

(2961) Pearce, J. A., "Fluorescence Measurements as a Quality Control Technique in Food Processing." Food in Canada 5, No. 6, 14-20 (1945). - The nature, measurement, and illumination with fluorescent light are discussed. Some vitamins or their precursors fluoresce, others when chemically treated produce substances which fluoresce. Flow sheets are given of two methods of extracting thiamin from food products, oxidizing it to thiochrome, and determining the fluorescence intensity.

B. A. 20, 520 (1946).

(2962) Pearce, J. A. and Reid, Margaret, "Liquid and Frozen Egg. III. Some Factors Affecting the Quality of Stored Frozen Egg." Can. J. Res., Sect. F, Technol. 24, No. 11, 437-44 (1946). - Liquids from eggs of various qualities packaged in a lamination of kraft paper to metal foil to cellophane and liquid from grade A eggs in wax paper with and without added ice were frozen at -40° F. and stored at 10, 0, and -10° F. for 12 months. Examination of baking properties and changes in pH, fluorescence, and reducing sugar content indicated the desirability of using liquid from grade A eggs, although liquid from grade C and cracked eggs may also be satisfactory; and of limiting the storage period for frozen egg stored at these temperatures to about 6 months. It was also found desirable to allow the frozen egg to age 1-2 months before use; and to use a highly moisture resistant barrier at all storage temperatures, although the wax paper and ice combination may be satisfactory at 0 and -10° F. Reducing sugar content decreased with an increase in the number of bacteria and, in addition, this measurement appeared to be a good indication of the quality of liquid and frozen egg. The deleterious effect of freezer burn (surface dehydration) was more pronounced in the samples wrapped in wax paper than in those wrapped in metallic material.

R. A. 2, 102-3 (1947).

(2963) Pearce, J. A., Tessier, H., Lavers, C. G., and Thistle, M. W., "Dried Whole Egg Powder. XXVI. Some Observations on the Quality of Powder Prepared from Frozen Liquid Egg." Can. J. Research 25, 173-9 (1947). - Satisfactory dried whole egg powder can be made from frozen eggs, provided care is used in the freezing. Grade A, C, or cracked eggs gave good quality dried egg powder, while powders made from frozen musty eggs or incubator rejects had much higher fluorescence and KCl values. Increase in frozen storage time decreased the quality of the powder. Storage at -10° F. is better than at

10 or 0° F. if the time is more than 6 months. The kind of package used for freezing makes little difference, but the quicker the eggs are frozen, the better the quality of egg powder made from them. Rapid defrosting is equally important, and the best quality dried egg was made from frozen egg defrosted in one hour. Dilution of the frozen egg during defrosting prior to drying also causes the egg powder to have higher fluorescence values and lower KCl solubility than undiluted egg.

F. I. 19, 1154 (1947).

(2964) Peffer, H. H., "Advances in Food Freezing Techniques." Food Freezing 1, 20-2, 36-8 (1945). - Advances in freezing techniques include improvement in equipment design, improvement in package materials and design, more knowledge of precooking foods for freezing, and better selection and preparation of foods for freezing. Laboratories are making valuable contributions by their researches.

R. A. 1, 94 (1946).

(2965) Penn, E. G., Hill, T. M., and Drew, D. E., "Tomorrow's (Frozen Food) Packages. I-III." Food Freezing 1, 10-1 (Nov.); 52-4 (Dec., 1945); 101-3 (Jan., 1946).

R. A. 1, 96 (1946).

(2966) Pennington, M. E., "The Freezing of Eggs." Refrig. Eng., Refrig. Eng. App. Data Sect. 42, No. 6, Sect. 2, No. 29, 1-6 (1941). - A rather complete general review of the frozen egg industry of the day is given. It is recommended that freezing be done in air blast tunnels at -20° F., in order to freeze the eggs as quickly and uniformly as possible. The accepted temperature for holding the frozen eggs is -5° to 0° F.

B. J. A.

(2967) Pennington, M. E., "Refrigeration, a Prime Essential of War." Refrig. Eng. 45, 89 (1943). - The importance of conservation, supply, and preservation of food, particularly perishables, during time of war is a concern of both present and future. Frozen foods are one contributing means of solving the problem. Refrigerating capacity of ships must be increased, and farm and home freezers have proved their desirability. Development of quick frozen foods is necessary to keep pace with consumer demand.

M. P.

(2968) Pennington, M. E., "Refrigeration, the First Essential in Quality Preservation." U. S. Egg and Poultry Mag. 51, 498-500 (1945). - Quick cooling of eggs and poultry is necessary to retard the growth of bacteria and molds and to inhibit enzymic activity. Bacterial growth and proliferation cease only when poultry is hard frozen (well under 15° F.). Better packaging of poultry offers the most promising deterrent to desiccation.

R. A. 1, 84 (1946).

(2969) Pennington, M. E., "Eliminating Losses in Frozen Poultry Storage." Frosted Food Field 3, No. 5, 4-5 (1946); U. S. Egg and Poultry Mag. 53, No. 2, 12, 39-40 (1947). - Dressed poultry in boxes, which are properly stacked to allow air circulation on all sides, will freeze in 72-96 hrs. in a 0 to -5° F. room. For best results, frozen poultry must be held at 0° F. or below. Tin cans or boxes filled to capacity in order to reduce air spaces in

the package to a minimum offer maximum protection against dehydration (freezer burn).

R. A. 2, 101 (1947).

(2970) Pensinger, C. R., "From a Pin to Frozen Foods." Frozen Food Indus. 2, No. 7, 10-1, 51 (1946). - Department stores plan to include a frozen food shop in their services to the consumer. Marshall Field's plan of organization is discussed as a possible model for the prospective dealer.

B. J. A.

(2971) Pentzer, W. T., "Biological Aspects of Precooling Fruits and Vegetables." Refrig. Eng. 53, No. 6, 511-3, 556 (1947). - Effect of temperature on physiology of plants with particular reference to those plant parts used for food; respiration; effect of temperature on loss of sugar and quality; microbiological activity.

E. I. 1947, 15276.

(2972) Perry, F. J., "Canada's Relationship to the Frozen Food Industry." Can. Food Packer 17, No. 8, 17-19 (1946).

(2973) Perry, M. A., "Frozen Food Lockers--Important Future Market for Canadian Electrical Industry." Elec. News 54, No. 12, 44-6, 31 (1945). - Requirements of modern locker plant discussed; diagram shows general layout of locker plant, and table gives average horsepower required and kilowatt-hour consumption for average plant of approximately 400 lockers.

E. I. 1945, 234.

(2974) Perry, R. L., Marsh, G. L., and Phaff, H. J., "Some Engineering Aspects of Blanching Cut Fruits for Dehydration." Agric. Eng. 26, No. 10, 421-4 (1945). - Report on joint research project of Quartermaster General's Office, U. S. Army, and University of California; boiler and cabinet blancher for cut fruit dehydration illustrated and described; blanching procedure for various types of fruits. Before University of California "Dehydration Conference for Grapes and Cut Fruits."

E. I. 1945, 434.

(2975) Perry, R. L., Gesellschaft für Lindes Eismaschinen A.G., Hildastrasse 8, Wiesbaden. Off. Pub. Bd., Report PB 1252, 1945. 10 pages. - Chief Engineer, Dr.-Ing. Erwin Loeser, was interviewed to obtain information on developments in equipment for quick freezing, and storing frozen foods. Dr. Loeser expressed a preference for the truck and tunnel air blast freezer made by Linde. Exhibit "A" is a description of the Krause-Linde procedure and equipment, by Dr. Simanowsky. It consists of two steps: (1) a freezing-out method in which a part of the water contained by the fruit juice is frozen to ice, and (2) separation of the ice from the concentrate. Exhibit "B" is a typewritten statement by Dr. Simanowsky on blanching of potatoes for dehydration, and blanching of peas before freezing. Exhibit "C" is a typewritten statement by Mr. Rothje describing the 80 sq. m. Imperial-fourbelt dryer, suitable for vegetables, potatoes, fruit, etc., of Solo Feinfrost, G.m.b.H. Translations of the Exhibits were by Z. I. Kertesz.

B. S. I. R. 1, 86 (1946).

(2976) Perry, R. L., Versüchstation für Konserven Industrie, Braunschweig. Off. Pub. Bd., Report, PB 4310, 1945. 6 pages. - The object of this study was to obtain information on dehydration and quick freezing developments. Preparation of vegetables and types of dehydraters employed are described.
B. S. I. R. 1, 306,(1946).

(2977) Perry, R. L., Report on Konservenfabrik Gifhorn, at Gifhorn, near Braunschweig. Off. Pub. Bd., Report, PB 4318, 1945. 11 pages. - This is a small cannery, employing up to 70 workers on each of two shifts at peak season. During the war, Anderson & Co. of Hamburg put in 2 portable Borsig-Loesch "paternoster" air blast freezing tunnels and 2 Alfred Teves, 3-cell freezing storage rooms. Two Schilde dehydrators and a Hollman dehydrated vegetable press were also installed for which drawings are shown. Drawing of Borsig-Loesch freezer is also included.
B. S. I. R. 1, 306 (1946).

(2978) Perry, R. L., Anderson and Co. (Hochsee Fischerei). Flottbeckes Chansee 199, Hamburg-Altona. Off. Pub. Bd., Report, PB 4339, 1945. 6 pages. - Anderson & Co. did not control the Birdseye process in Germany, where it was handled by Solo Feinfrost, although they may have been associated with Solo Feinfrost in exploitation in occupied territory. Their freezing operations were accomplished with air blast freezing equipment. They packed about 17,000 tons of fruits and vegetables in 1944 in Germany, Holland, France, and Italy. Part of the frozen goods were packed for the Wehrmacht, and part for civilian use. Anderson & Co. is alert in laboratory developments for food freezing, but has not surpassed work in the U. S. Table I of the report shows a comparison of performance of typical German air blast freezers. Drawing of a conveyor precooler similar to conveyor blancher proposed by Anderson & Co. included.
B. S. I. R. 1, 363 (1946).

(2979) Perry, R. L., Report on Solo Feinfrost, G.m.b.H., Friedensalle 333, Hamburg-Bahrenfeld. Off. Pub. Bd., Report, PB 4354, 1945. 11 pages. - About 1938, Solo Feinfrost was set up by the margarine interests for fruit and vegetable freezing. Plate freezers, after Birdseye patents, were built for Solo Feinfrost. Exhibit A is a description of the procedure and equipment of the Krause-Linde method of freezing-out. Exhibit B is a report on steam blanching of vegetables. Exhibit C is a report on the Imperial dehydrator. Exhibits A and B prepared by Dr. Simanowsky, Exhibit C by Mr. Rothje with translations by Z. I. Kertesz. Photographs of the Krause drum are shown. More particularly, potato and pea blanching is stressed.
B. S. I. R. 1, 306 (1946).

(2980) Perry, R. L., Hans A. Keune, Hamburg, Heilwig Strasse 132. Off. Pub. Bd., Report, PB 6659, 1945. 4 pages. - This is a short report on the most widely used refrigeration methods in Germany, written by Hans A. Keune, former operator of the Hans A. Keune Press, which had published books on the fish industry and on frozen foods. The three methods used by the refrigerator industry in Germany were: "Kontakt-process" method Birdseye of the Solo-Feinfrost G.m.b.H., Berlin, and Nordsee A-G., Wesermunde; "Air-refrigeration" method Heckermann and others, from Anderson & Co. K-G., Hamburg; "Solo-spray" process method Z (Zarotsohenscheff) from Vereinigte Tiefkuhlgesellschaft Lohman & Co. K-G., Hamburg.
B. S. I. R. 1, 492 (1946).

(2981) Perry, R. L., Report on Holsteinische Konserven Fabrik Gerlingsweg, Elmshorn. Off. Pub. Bd., Report, PB 6661, 1945. 9 pages. - This report describes the Linde Karussell freezer, a contact freezer in which the commodities are frozen in packages, slightly compressed between ribbed plates which are cooled by an air blast. As far as the products are concerned, the system is similar to the Birdseye, but the arrangement is entirely different. A report of a test of the capacity of the Karussell freezing machine and an illustration of the machine are inoluded.

B. S. I. R. 1, 552 (1946).

(2982) Petty, P. B., "Metals for Service at Subzero Temperatures." Chem. and Met. Eng. 52, No. 6, 102-3 (1945). - Examination of subzero behavior of some common metals and alloys; principles of Charpy and Izod impact tests for evaluating data and comparing metals; typical low temperature properties of aluminum, nickel and stainless steel, copper and lead.

E. I. 1945, 679.

(2983) Phillips, W. R., "Freezing Rates of Fruits and Vegetables at Various Air Velocities." Refrig. Eng. 52, No. 5, 401-3 (1947). - Results of the effect of varying air velocities on freezing rates are discussed. Air velocities up to 700 ft. per min. at 0° F. and -20° F. were employed. Only one type and size of container was used throughout these experiments--a cylindrical cardboard carton 3½ inches in diameter and 4 inches deep (inside measurements). The products were placed in an air tunnel in a freezer room at the required temperature. Results show that even a slow air flow rate markedly speeds up freezing rates. The freezing rate appears to increase up to an air flow rate of 200-300 ft. per min., but beyond this rate, the increased rate of freezing is not as great. By using a good air flow at 0° F., the freezing time in pint cartons can be reduced by approximatoly 45%. As great a reduction at 0° F. in freezing rates can be obtained by employing air flow as can be obtained by using a -20° F. temperature. In comparisons of different types of packing on freezing rates, experiment showed that in every instance strawberries packed in syrup froze in less time than did the dry pack.

A. S. C.

(2984) Pickhardt, W. J., "Equipment Required for Highway Frozen Food Transport." West. Canner and Pkr. 39, No. 2, 76-7 (1947).

R. A. 2, 117 (1947).

(2985) Pierce, S. W. and Helms, J. F., "0° F. WVT of Frozen Food Containers and Sheet Materials." Frozen Food Ind. 3, No. 6, 12-4, 33-4 (1947). - A new method using a dried gas has been developed for the determination of water vapor transfer (WVT) of completed frozen food containers at conditions approximating those of storage. The apparatus consists of an enclosed gas system, the larger part of which is inside a constant-temperature cabinet. Nitrogen is used as the gas medium to transport water vapor. Operation and use of the equipment are discussed, and tables indicate data on WVT for frozen food containers and sheet materials.

M. B.

(2986) Pierce, S. W. and Helms, J. F., "Method for the Determination of Water Vapor Permeability at Low Temperatures; Frozen Food Containers." Paper Tr. J. 124, 64-6 (Apr. 17, 1947); Mod. Packaging 20, No. 8, 161-4 (1947). -

Dry nitrogen is circulated through an enclosed gas system and passed over the material to be tested. After the system has reached equilibrium, weighing tubes of dehydrating materials receive the water vapor which the nitrogen has picked up on its passage through the chamber, and are weighed periodically. In this manner, accurate data on water vapor transmission rates have been obtained for both set-up containers and sheet materials. This method is applicable to determinations of protection required by various frozen foods.

M. P.

(2987) Piettre, M., "Drying at Low Temperatures, or Freeze-Drying; its Theoretical Advantages, its Practical Possibilities." Acad. d'Agr. de France Compt. Rend. 32, 70-73 (1946).

(2988) Piettre, M., "The Preparation of a Security Supply of Frozen Foods for the Duration of 1947." Acad. d'Agr. de France Compt. Rend. 32, 346-51 (1946).

(2989) Plagge, H. H., "Speed is the Keynote to Quality." Quick Frozen Foods 6, No. 9, 56, 70; No. 10, 52, 62 (1944). - Stress is placed on the need for speed in harvesting fruits and vegetables at the right time for highest quality, in processing them quickly prior to freezing, in blanching properly where necessary, in prompt cooling after blanching, in packaging, and in freezing, storing, and utilization. Details applicable to many specific fruits and vegetables are included.

B. H. W.

(2990) Plummer, K. V., "The Transportation of Frosted Foods." Quick Frozen Foods 9, No. 11, 81-2 (1947). - A general discussion of past work and present developments in refrigerated cars for the transportation of frozen foods by the Pacific Fruit Express.

B. J. A.

(2991) Poe, C. F. and Neilson, G. W., "Effect of Low Temperature on the Vitamin A Content of Carrots." Univ. Colorado Studies, Series D. No. 2, 331-4 (1947). - Holding carrots at -80° for 2 hours had no detrimental effect on their vitamin A content.

C. A. 41, 4867 (1947).

(2992) Pollock, C., "Packaging the Gobbler." Food Ind. 19, 179-81 (1947). - Packaging must go hand in hand with developments in eviscerating and freezing of turkeys. In order to meet consumer demands for smaller birds and at the same time use the cheaper, larger tom turkeys, methods for grading, packaging, and cooking cut-up birds were developed. Small birds are packaged whole, being wrapped in moisture-proof cellophane and placed in waxed cartons. The actual freezing is carried out in a wire-bound shipping unit in which 4 cartons of turkeys are arranged with ends exposed, thus decreasing freezing time due to controlled air flow.

B. J. A.

(2993) Porter, T., et al., "Processed Green Beans." J. Am. Dietetic Assn. 22, No. 12, 1084-7 (1946). - A study of the effect of commercial canning,

freezing, drying, and subsequent preparation for the table on the palatability, ascorbic acid, and carotene content of green beans. The palatability score of the frozen beans was higher than that of the canned or dried beans. Each method of processing resulted in losses of reduced ascorbic acid; the greatest occurred in drying, which also was the only method resulting in any loss of carotene. Cooking losses of ascorbic acid for canned beans stored 6 months was 82.3%; frozen beans stored 1 month, 84.3%; frozen beans stored 6 months, 77.6%; and dried beans stored 1 month, 25.4%. Frozen beans contained considerably more ascorbic acid than the canned both before and after cooking, although the percentage loss was greater.

R. A. 2, 95 (1947).

(2994) Pottinger, S. R., "Developments in Freezing Oysters." Am. Cookery 51, No. 7, 24-5, 61 (1946). - A discussion is given of oyster farming and freezing, packaging, and storage of oysters. Although oysters are highly perishable and very seasonal, only small quantities are now frozen, but interest has been increasing of late. Tests show that oysters which were not strictly fresh when frozen deteriorated rapidly and became inedible within 3 months.

R. A. 1, 151 (1946).

(2995) Pottinger, S. R., Kerr, R. G., and Lanham, W. B., Jr., "Testing Packaging Materials for Quick Frozen Oysters." Food Ind. 19, 324-6, 444, 446 (1947). - Several types of commercial materials, including tin cans, were used for packaging oysters to be frozen and stored. Samples in each type of container were examined for appearance, quality, flavor, and pH each month during a 1-year storage period. Standard palatability scores averaged 9.2 out of a possible 10 over the entire period for those packed in the best grades of moisture-vapor retention materials. In this same type of package the loss of moisture was less than 1% for the period. The type of packaging material had no significant effect on the pH of the oysters over the 12 months' trial. Waxed cartons without liner or overwrap of moisture-vapor proof material made a poor showing as far as losses in weight and flavor were concerned.

R. A. 2, 190 (1947).

(2996) Powers, J. J. and Esselen, W. B., "Use of Calcium Salts in Freezing McIntosh Apples." Fruit Prod. J. 25, 200-2, 217 (1946). - The tendency for McIntosh apples to become "mushy" when baked or stewed in pies may be avoided by treating the sliced fresh apples with $CaCl_2$ solution. The $CaCl_2$ required is dependent on whether the apple slices are to be used fresh, or preserved by freezing or by canning, and also on whether or not sugar is to be added; in general, the concentration varies between 0.03% and 1.5%.

B. A. BIII, 138-9 (1946).

(2997) Fresper, Mary L., "Retention of Nutrients in Quick Frozen Foods: Review of Literature." J. Am. Dietetic Assn. 22, 665-9 (1946). - Percentage of nutrient retentions of fruits and vegetables during freezing procedures, storage, and preparation are given.

R. A. 2, 37 (1947).

(2998) Prince, B. L., "Packers Brands vs. Private Brands." Quick Frozen Foods 8, No. 7, 83, 118 (1946). - In frozen foods.

(2999) Prince, B. L., " The Frozen Food Industry at the Crossroads." Quick Frozen Foods 9, No. 9,X-XI (1947). - A review of the frozen food distributer's problem.

B. J. A.

(3000) Pringle, J. D., "Frozen Food Research at the Department of Agriculture." Food in Canada 6, No. 4, 17-19 (1946). - Since ascorbic acid prevents the serious discoloration of some fruits in freezing, its addition is about to become routine. A musty condition due to enzymatic action is prevented by blanching before freezing. Strawberries are best crushed before freezing. Quick freezing produces the best results and gives less tissue breakdown. Generally speaking, produots frozen in less than 12 hours are satisfactory, and should be handled and packed quiokly before freezing. Fruit is best eaten with a few crystals of ice remaining; complete thawing produces a flabby product. Vegetables should generally be cooked before they are allowed to thaw.

B. A. 20, 1621 (1946).

(3001) Prinz, M. V. H., " Frozen Food Facts." Food in Canada 6, No. 11, 13-16 (1946). - First of a series of articles on the industry.

(3002) Prinz, M. V. H., "Freezing Methods and their Applications." Food in Canada 7, No. 1, 22-25 (1947). - Second in a series.

(3003) Prinz, M. V. H., "Success or Failure in Quick Freezing? Your Equipment can Decide." Food in Canada 7, No. 2, 16-19 (1947). - Third in a series.

(3004) Prinz, M. V. H., "What are the Best Sellers among Frozen Food Specialties?" Food in Canada 7, No. 3, 26-28 (1947). - Fourth in a series.

(3005) Proctor, B. E., "Recent Food Freezing Research and Developments." Canning Trade 68, No. 31, 26-39 (1946).

(3006) Proctor, B. E. and Phillips, A. W., Jr., "Microbiological Aspects of Frozen Precooked Foods." Refrig. Eng. 53, No. 1, 30-3 (1947); Frozen Food Ind. 3, No. 1, 16-8, 38 (1947). - Bacteriological analyses were made of more than 70 different types of frozen precooked foods from some 30 manufacturers located in 11 states. Both plate and direct microscopic tests were made. Data indicate that some precooked frozen foods are not being handled properly. Direct microscopic count was found to be a good check on the sanitary quality of the produot. The direct microscopic test is a good continuous control for plant use. Immediate freezing following manufacture and continuous storage at below 0° F. were found highly important.

R. A. 2, 106 (1947).

(3007) Quidnuno, A. N., "Growth of Locker Plants in Dairy Industry." Canad. Dairy and Ice Cream J. 26, No. 4, 80, 82, 84 (1947). - The rapid growth of locker plants is traced from their beginning, with the indiscriminate storage of surplus food in the cold storage rooms of dairies as a gratuitous service to its customers, to the present day sanitary plant which furnishes complete processing services.

R. A. 2, 200 (1947).

(3008) Quidnunc, A. N., "Quick-Freezing in Locker Storage Plants." Canad. Dairy and Ice Cream J. 26, No. 5, 84, 86 (1947).

(3009) Quivey, O. K. and Winklepleck, R. L., "Opportunities for the Quiok Freezer in the Bumper Belt." Quick Frozen Foods 8, No. 12, 67-9 (1946). - The "Bumper Belt" comprises the area from Maryland and Pennsylvania to Illinois, where peas, spinaoh, limas, snap beans, and sweet corn are produced in abundance, as well as tomatoes in Illinois. These excellent crop areas can also supply fruits and fish to the freezing industry when adequate plants are set up to accommodate the large yield. The Baltimore and Ohio Railroad serves all these states and is cooperating with private industry to help them establish new quiok freezing operations.

B. J. A.

(3010) Rabak, W. and Stark, J. B., "Practical Experiments Demonstrate Protective Value of Double Wrap." West. Canner and Packer 38, No. 11, 74-5 (1946); Food Indus. 18, 1690-91, 1828 (1946). - Frozen food packaging.

(3011) Rabak, W., "Frozen Food; Packaging Requirements; Report on a new Dip-coat Package." Mod. Packaging 20, No. 6, 112-15, 164 (1947); Quick Frozen Foods 9, No 6, 68-9 (1947). - The retention of quality in frozen foods is dependent upon protection against dehydration and oxidation during low temperature storage. A discussion of packaging requirements and a comparison of the efficiencies of various types of packages is presented. The tightness of the seal is a major factor determining the efficiency of a packaging material. Therefore, a continuous film of protective thermoplastic material applied as a dip coating directly to the product or to the package containing it is quite efficient, its efficiency approaching that of a hermetically-sealed metal or glass container. The thermoplastic film must be non-toxic, chemically stable, odorless, water-insoluble, and suitably flexible at low temperatures. Preliminary results from investigations conduoted at the Western Regional Research Laboratory, U. S. Department of Agriculture, indicate the praoticality of dip-coating, which reduces oxidation, prevents loss of moisture, and minimizes the hazard of "freezer burn". Most suitable and readily available types of dip-coatings at the present time are those with plasticized paraffin base or some of the microorystalline paraffins.

D. M. G.

(3012) Rabuffo, V. M., "The Ice Cream Industry and Frozen Foods; a Special Analysis." Ice Cream Trade J. 42, No. 10, 100-101, 169-175 (1946).

(3013) Ramsbottom, J. M., "Freezer Storage Effect on Fresh Meat Quality." Refrig. Eng. 53, 19-23 (1947); Food N. and Views Bul., No. 39, 5-6 (1947); Frozen Food Industry 3, No. 3, 8-11, 42-3 (1947). - Quality of frozen beef, lamb, and pork, especially appearance and palatability in the cooked state, decreased with an increase in temperature and time of freezer storage. Storage temperature of 10° F. was muoh more effective than 20 and 26° F. in retaining original quality. Meats stored at 26° F. had less than 30 days' storage life while most meat products stored at -10 and -20° F. still rated good after 365 days. Storage at -10° F. or lower for 7 years did not significantly change tenderness in beef steaks but did alter aroma, juiciness, and flavor of lean meat, and markedly changed the appearance and flavor of fatty tissue. Lambs storod 10 years at 0° F. showed freezer burn and ranoid fat. Chemical analyses of stored frozen lamb compared favorably in general with analyses of fresh lamb except for myoglobin changes in desicoated superficial tissues.

R. A. 2, 183 (1947).

(3014) Randall, J. C., "Packaging Frozen Foods." Distrib. Age 45, No. 6, 65, 78 (1946).

(3015) Ransom, B. H., "Effects of Refrigeration upon Larvae of Trichinella spiralis." J. Agr. Research 5, 819-54 (1916). - For practical application

of refrigeration as a means of destroying the vitality of trichinae, exhaustive tests show that meat should be frozen at not higher than 5° F. for not less than 20 days.

B. J. A.

(3016) Rasenack and Mayer, "The Preparation of Raw Sausage from Fresh or Frozen Beef in Adverse Climatio Conditions in Field Slaughter Houses." Ztschr. Fleisch-und Milch-hyg. 54, 101-6 (1944).

(3017) Ratsek, J. C. and Morris H. F. Adaptability of Peaches to Quick Freezing. Texas Agr. Expt. Prog. Rept. No. 885, 1944.

(3018) Redfield, G. M. and Witz, R. L. Preservation of Foods on the Farm by Freezing. Purdue Univ. Agric. Exp. Sta. Bull. No. 507, 1945. 16 pages. - Three typical rural home food freezing units with capacities of 6, 15, and 24 cu. ft. and a looker in a commeroial plant were used in this study. The quality of the food stored in home units which maintained a temperature of 5° F. or below was as high as that of the food stored in the commeroial locker. Peaches and cherries were better preserved in the home units than in the locker. Data on the cost of operating the home units are given.

R. A. 1, 215 (1946).

(3019) Redfield, H. W. Examination of Frozen Egg Products and Interpretation of Results. U. S. D. A. Dept. Bull. No. 846, 1920. 96 pages. - Analytical results for eggs of the same quality agree very closely, no matter whether the eggs are produced and examined in Washington, Philadelphia, New York, Chicago, or San Francisco. When carefully followed, the analytical methods described in this bulletin will give concordant results in the hands of a number of analysts. A formula has been devised which will separate into edible and inedible groups samples of liquid or frozen white, whole eggs, yolky mixtures, and yolk prepared from either fresh eggs or storage eggs. A formula for sugared yolk is also proposed.

Author's Summary.

(3020) Reed, H. M., "Investigations on the Freezing Storage of Figs." Quick Frozen Foods 8, No. 7, 84-5 (1946). - Magnolia figs peeled before freezing had better appearanoe and flavor, but poorer texture, than when unpeeled. Blanching improved skin texture slightly and removed spray residue, but flavor was lost if steaming was over 1 1/2 min. A 30% sucrose sirup was used in the packs. General quality was well maintained for 6 months storage at 0° F., but had deteriorated markedly in 16 months.

B. A. 20, 1213 (1946).

(3021) Reed, P. B., "Design, Construction, and Maintenanoe of Looker Plants." Looker Operator 7, No. 5, 34 (1945).--Recommendations are given for locker plant construction and operation.

R. A. 1, 98 (1946).

(3022) Reid, F. M., "Refrigerated Trailers Move Frozen Foods." Food Freezing 1, 46-7 (1945). - Refrigeration equipment is used to either oool or heat trailer cargo as ambient temperature requires.

R. A. 1, 101 (1946).

(3023) Reid, M., "Liquid and Frozen Egg. I. Application of a Fluorescence Measurement to Liquid and Frozen Egg." Can. J. Res., Sect. F, Technol. 24, No. 3, 130-5 (1946). - Measurements of fluorescence on the exudate from defrosted eggs as a means of determining quality of frozen eggs shows promise as a useful tool in drying plants. The serums extracted with chloroform from high quality broken fresh eggs had a higher fluorescence than the serums from the materials after standing at 30-90° F. for short periods. However, fluorescence increased when deterioration became evident. Freezing of liquid eggs resulted in a decrease in fluorescent materials. Exudate occurs from frozen eggs after storage for longer than a month but does not occur when held for shorter periods.

R. A. 2, 102 (1947).

(3024) Reifsteck, C. E., "Warehousing Frozen Foods." Distrib. Age 46, No. 3, 81-3 (1947).

(3025) Rendle, T., "The Preservation of Potatoes for Human Consumption." Chem. and Indus. 45, 354-59 (1945). - In choosing the technique and process for the freezing preservation of potatoes, it is important that the gelatinized starch granules (formed when heated) are retained in situ in the vegetable cells and that the cells receive minimum damage. For these reasons quick freezing has not given results as good as the other methods. In ease and speed of preparation, the products fall into the order of (a) canned, (b) mashed potato powder, and (c) dehydrated strips, all of which are discussed.

A. S. C.

(3026) Renwick, D. J., "Freezer Graphs Give Trade Comparative Data on Prices, Condensing Unit Sizes." Air Cond. and Refrig. N. 50, No. 2, 11 (1947). - Graphical presentation of selling price and condensing unit size vs. cabinet size for farm and home freezers.

R. A. 2, 111 (1947).

(3027) Ribeiro, J. de A., "Table-cream (Frozen)." Rev. dos Criadores 17, No. 6, 40-3 (1946).

(3028) Ricard, J. H., "French Colonial Refrigeration Equipment." La Revue Generale du Froid 22, No. 1, 11-15, 17-20 (1945). - France recognizes the need of providing refrigeration establishments in her colonies from the points of view of public health and of economic expansion. The need of refrigeration for use with comfort air conditioning in homes of colonial administrators, hospitals, etc., is well recognized and many such installations are expected in the near future. Although France was the country of Charles Tellier, who was called "the father of refrigeration" by the International Refrigeration Congress, no other country has shown equal hostility to the use of cold storage for food products. Prior to the war, France had very little in the way of adequate cold storage facilities, and the equipment which was available for rail or marine service was not used to full advantage because of the lack of a coordinated general organization. Future development of adequate colonial refrigeration networks depends on (1) availability of small cold storage spaces in the various localities where food is produced; (2) adequate refrigerated transit facilities to safely bring frozen produce from the producer to the point of shipment; (3) large cold storage spaces at depots, docks, and airports; (4) adequate

facilities for storage on shipboard; (5) storage space at port of unloading; (6) facilities for safe transportation to locality of user; (7) availability of small cabinets to assure safe distribution by retailer and safe storage by consumer.

R. A. 1, 136 (1946).

(3029) Rice, I. L., "I Was There at the Beginning." Quick Frozen Foods 9, No. 3, 80-1, 108, 112 (1946). - A new historical discussion of the early financial struggles of the first quick frozen foods company, Birdseye Seafoods Co., and its subsequent sale to the Postum Co., later General-Foods Corporation.

B. J. A.

(3030) Rice, I. L., "Frozen Food Financing." Quick Frozen Foods 9, No. 6, 64, 65 (1947). - The coming slow-up in frozen food sales and lower prices on some items necessitate stronger financing. The author believes that the best solution to the problem lies in the sale or exchange of a sizable block of stock of the company to a large and well financed packer or through mergers of several companies. The favorable aspects of larger firms are presented.

A. S. C.

(3031) Riddell, G. L., "Packaging Research. Its Application to the Food Industry." Food 15, 32-4 (1946). - The various factors influencing the keeping quality of foods packed in paper, board, film, or metal foil are discussed and a comprehensive research program is outlined. Tests on H_2O-vapor permeability have shown that under both temperate and tropical conditions, laminated sheet composed of kraft paper, bitumen, metal foil, and heat-sealing compound has the lowest permeability, followed in regular order by moistureproof viscose film, union kraft, waxed glassine, glassine, and bitumen-impregnated board. Creasing increases the permeability in every case. Under tropical conditions the permeability is much higher than under temperate conditions.

C. A. 40, 1945 (1946).

(3032) Roadhouse, C. L. and Henderson, J. L., "How Quick Freezing Affects Keeping Quality of Milk and Cream." Food Ind. 12, No. 6, 54-5 (1940).

(3033) Roberts, H. R., "The Future of the Frozen Foods Business Looms Large." West. Frozen Foods 6, No. 6, 4-6 (1945).

(3034) Robinson, F. A., "The Vitamins." Food Mer. 21, No. 3, 99-102 (1946). - A review of progress during 1945 on vitamin studies including synthesis, method of analysis, function, and content in foods.

R. A. 1, 151 (1946).

(3035) Robinson, J. M., "Mountain Lookers." Locker Operator 7, No. 7, 14-6, 60-3 (1946).

(3036) Rocha, H., "The Fascinating Future of Frozen Foods." Seleo. Rurales 1, No. 3. 54-6 (1946).

(3037) Rodabaugh, J. H., "Economic Aspects of the Frozen Egg Industry in the United States." Ice and Refrig. 97, 265-7 (1939); Proc. World's Poultry Congr., 7th Congr., 364-7 (1939).

(3038) Rogatnick, J. H., "Iceland's Quick Frozen Fish Fillet Industry." Foreign Commerce Weekly 22, No. 9, 11, 45 (1946); Frozen Food Ind. 2, No. 10, 16-7, 55 (1946). - Iceland is greatly interested in the development of the quick-frozen fish-fillet industry, since it assures another profitable outlet for the country's leading export. The interval between the time the fish are caught, landed, and processed into frozen fillets is between 7 and 12 hours. Although lay-out and design of fish-fillet freezing plants may vary, there is little difference in the basic process. Approximately 60% of the input tonnage of fish is lost in the process, with the fish usually weighing 15 to 20 pounds each. The filleting process is described in detail for a particular plant. Quick-freeze units use ammonia as a freezing element, and the fish remain on trays in the freezers 100 minutes, at -40° C., and the trays are then dipped into tubs of cold water to facilitate removing the individual packages of fillets. The packages are then banded in cartons and placed in cold storage rooms where the temperature is maintained at -22 to -25° C. Methods of improving the process, as dipping fish in brine to preserve flavor and quality, and consumer package appeal, are continually being sought.

A. S. C.

(3039) Rogers, A. J., "Quick Freezing of Cherries." Fruit Prod. J. 20, 80, 91 (1940). - The recommended method for freezing pie-grade cherries is to expose the pitted cherries in a No. 30 tin to a "sharp-freeze" temperature of -18° C. to -26° C. (embodying air circulation), followed by storage at -18° C. Addition of 1 pint of sugar to every 4 or 5 pints of fruit is an improvement.

Br. A. BIII, 210 (Aug., 1941).

(3040) Rogers, A. J., "Freezing. How far Should Cooperatives Go?" Food Packer 27, No. 12, 50-2 (1946). - Fruits and vegetables.

(3041) Rogers, M. T., "Frozen Food Packages of the Future." West. Canner & Packer 39, No. 5, 69-71, 86 (1947); Frozen Food Ind. 3, No. 6, 16-7, 43-5 (1947); Good Packaging 8, No. 4, 5-6, 31, 36-7 (1947); Quick Frozen Foods 9, No. 9, VII-IX (1947); Food Packer 28, No. 5, 32-3, 50 (1947). - The most desirable modern trends point up the importance of: (1) standardized sizes of packages, (2) high-speed handling properties, and (3) sufficient protective ability to keep the product 18 months without deterioration. The requirements for packages today would be a WVP optimum figure of 1.0 to 1.2 grams per 100 sq. in. per 24 hours at 100° F. and 92% rh. The present method of testing packages involves filling with CaC_{12} (or some equally hygroscopic material) and then determining the moisture picked up by the package.

B. J. A.

(3042) Rogers, P. D., "How to Plan a Locker Plant for Effective and Easy Cleanup." Food Freezing 2, 360-62 (1947).

(3043) Rogers, S. A., Jr., "Electronic Drying and Dehydrofreezing--New Terms in the Future of Food Dehydration." South. Food Processing 1, No. 5, 21-2 (1946).

(3044) Rogers, W., "The Broker in Frozen Foods." Quick Frozen Foods 9, No. 9, XI-XII; South Canner & Packer 8, No. 5, 12-13, 28 (1947). - General discussion.

B. J. A.

(3045) Roggia, P., "Boston Strause Launches Large-Scale Drive in California for Oven-Ready Frozen Pies." Bakers' Weekly 134, No. 7, 43-4, 58 (1947).

(3046) Rolfs, S., Freezing Foods at Home. Minneapolis, Minn.: Van Wald Stevens Co., 1946. 85 pages.

R. A. 1, 216 (1946).

(3047) Rorty, J. and Norman, N. P., "TVA Engineers Save Crops by Quick Freeze Methods." Coop. Cons. 12, No. 23, 2 (1945).

(3048) Rosberg, N. "Freezing Plant Construction." Fruit Prod. J. 26, 238 (1947). - A review.

R. A. 2, 162 (1947).

(3049) Rose, D. H. and Johnson, H. D. "Undercooling Retards Freezing of Canned Foods." Food Indust. 18, No. 4, 513-17; No. 6, 866-9; No. 7, 1034-37; No. 9, 1370-71 (1946). - Freezing point data sheets and cooling curves for various types of canned foods presented.

E. I. 1946, 964.

(3050) Rosenberg, L. J., "Frozen Foods From a Retailer's Viewpoint." The Research Engineer 9, No. 2, 7-8, 19-20 (1947). - Frozen food retailers are interested in frozen foods only as they are interested in any items which they may sell at a profit, and few retailers at present can do enough volume selling to make frozen foods carry their share of the overhead. While the frozen foods specialty store has done a thriving business in some areas through selling precooked dishes and war-scarce foods, the independent food store, the grocery chains, supermarkets, department stores, and even house-to-house delivery systems will be the volume selling media of the future. If frozen foods are to become staple items, the retailer feels that the packer must lower his unit price, improve the quality of his pack, and improve the appearance of his products and their packages. Well-advertised brand names are important to the retailer, as are standard packages designed to fit the home refrigerator's frozen food compartment. Cooking or handling instructions should appear on the package. The marketing of frozen meats on a mass production basis might prove highly economic to packing house and small store alike.

B. H. W.

(3051) Rowland, C. C., "Transportation of Frozen Foods--Refrigerator Car Service." Ice and Refrig. 110, No. 1, 49-50 (1946).

(3052) Rudolph, W., "Niederriter's Locker Plant at Erie, Pa. is a Four-in-One Operation." Locker Operator 7 No. 9, 18-19, 56-57 (1946).

(3053) Ruh, E. L., Conklin, G. E., and Curran, J. E., "Thermostatic Bath for Low Temperatures." Indus. & Eng. Chem. (Anal. Ed.) 17, No. 7, 451-2 (1945). Thermostatic bath, primarily for low temperature visoosity determinations, operates effeotively at temperatures ranging from + 40° to - 70° F.; it consists of three-stage installation, one bath containing dry ice and isopropyl alcohol, second bath maintained under rough automatic control, and third bath under close control.

E. I. 1945, 652.

(3054) Saatchan, A., "Kinetics of the Peroxydase Reaction at Temperatures Between + 20° and - 18°." Biokhimiia 11, 89-97 (1946).

(3055) Sadikov, V. S. and Chaletzkaja, E. G., "Biochemistry of Proteins. (H). Influence of Freezing and Salting on Meat Proteins." Proc. Sci. Inst. Vitamin Res. U. S. S. R. 1, 123-41 (1936). - Freezing at -17° C. for 3-10 days causes no change in the nitrogen distribution of fresh lean beef. Wet salting causes 10% dehydration and 1% loss in albumin-nitrogen, but accelerates enzyme action. Dry-salting retards enzyme activity.
Br. A. BIII, 46 (Feb., 1941).

(3056) Sampson, W., "Steam Jet Refrigeration for Marine Purposes." Ship Bldg. & Shipg. Rec. 68, No. 15, 411-3 (1946). - Author states that field for steam jet refrigeration is mainly in oooling range, for although plants were built and operated at temperatures below freezing point, using brine as heat carrying medium, plants are designed as series jet machines, and are of very low efficiency; principles described; thermo-compressor action; advantages of steam jet; applications. Before Inst. Mar. Engrs.
E. I. 1946, 1036.

(3057) Sander, W. D., "Veteran Needs Special Knowledge to Succeed." Quick Frozen Foods 9, No. 2, 70-71 (1946). - In the frozen food industry.

(3058) Sandor, I., "Cooked Foods." Quick Frozen Foods 8, No. 6, 8, 10 (1946); No. 9, 32 (1946). - Problems involved in freezing of roasts.

(3059) Sangers, W. J., "Some Possible Influences of Deep Freezing Upon our Horticulture." Economist (Haarlem) 95, No. 1, 43-63 (1947). - Vegetable industry in the Netherlands.

(3060) Sater, L. E., "Economics of Farm Freezers." Agr. Engin. 28, 111-112, 115 (1947). - The average family of 4 will require a 24 cu. ft. commeroial freezer, allowing 30 pounds of foodstuff per cu. ft. of storage space, which will cost approximately $170 per year to own and operate. A home-built walk-in cabinet with 75 cu. ft. of 0° F. storage and about 600 cu. ft. of 35° F. storage, on the same basis, will cost the farmer about $174 per year, with the advantage of 3 times the freezing capacity plus cooler storage facilities. The rental on a 24 cu. ft. locker plus transportation cost, assumed to be 40¢ per week, amounts to approximately $112 per year. A combination of a 6 cu. ft. freezer at home supplementing 3 rented lockers will oost $155. This arrangement ensures higher quality fruits and vegetables beoause of rapid handling from garden to freezer, and provides the satisfaction of having an ample supply of frozen food at home.
R. A. 2, 197-8 (1947).

(3061) Sater, L. E., et al., "The Effect of Various Pretreatments of Frozen Peaches on Quality." Food Freezing 2, No. 1, 128-31, 144, 162 (1947). -

The effectiveness for color and flavor retention of a minute dip in 0.1% citric acid, 0.1% thiourea, 0.75% sodium bisulfite, respectively, was compared using the Golden Jubilee and Elberta peaches. The peaches were peeled by scalding in boiling water, pitted, sliced, and, after treatment, were packed at the rate of 400 g. peaches to 225 g. 40% sirup or to 133 g. dry sugar, frozen, and judged for palatability after storage for 4, 8, and 12 months at 0° F. Samples were removed from 0° F., held for 17 hours at about 15° F., then thawed for from 6.5 hours (dry sugar) to 7.5 hours (sirup) and examined with some ice crystals present. In another experiment, September Elbertas were packed with 40 and 60% sirup containing 200 mg. ascorbic acid per 100 g. 60% sirup, and 300-450 mg. ascorbic acid per 225 g. 40% sirup. These packs were compared with those dipped in 0.1% citric acid before packing in plain sirup. Regardless of the anti-darkening agent used, the peaches packed in 225 g. of 40% sirup were superior in all respects to those packed with dry sugar (3:1) or with 100 g. of 60% sirup. The flavor of the untreated peaches packed in 40% sirup remained good throughout 8 months of storage but dropped to fair after 12 months. Those packed in dry sugar were rated fair to poor, respectively, during the same period. The texture ratings of both the sirup and sugar packed peaches dropped gradually from good to fair during a year's storage. Although there was undiminished enzyme activity in the untreated peaches, those packed in sirup maintained good color with only slight browning on the rims. There was little loss in ascorbic acid during 4 months' storage, but after 12 months only 46% retention was found in the untreated packs. Ascorbic acid added to the sirup was effective in preventing browning, though phenolase activity was but moderately inhibited. The natural peach flavor, however, was masked in these samples by a slight bitterness. The peaches of this lot which were dipped in citric acid were also rated lower after 12 months than the early Elbertas or Golden Jubilee. Average retention of ascorbic acid in the ascorbic acid-sirup pack was 80% throughout the first 8 months and 70% after a year. Flavor and texture score for citric acid and "Frulite" (thiourea) dipped peaches showed little variation from those untreated; the amount of browning was about the same also. Ascorbic acid retention in "Frulite" and citric acid packs was 56 and 38%, respectively, after 12 months. Sodium bisulfite in concentrations used was the most effective of all the anti-darkening agents in reducing phenolase activity and preventing browning but had an undesirable bleaching effect and produced objectionable flavors and odors. On the basis of the data presented, no one of the anti-darkening agents can be selected as markedly superior. Ascorbic acid in sirup was most promising but was applied to peaches of poorer initial quality.

R. A. 2, 98 (1947).

(3062) Savidge, D. W., "Are Frozen Food Distributors Missing this Boat?" Quick Frozen Foods 9, No. 11, 83, 94 (1947). - Due to the fact that boats used for hunting trips always carry large refrigerators, there is a good potential market here for stocking these expeditions with frozen foods. Also, valuable storage space and time spent in preparing food are saved by using frozen goods. The cleanliness and ease of disposal of wrappings, etc., is another item of importance.

B. J. A.

(3063) Sayles, C. I., "Tomorrow's (Frozen Food) Packages." Food Freezing 1, 246-47, 278 (1945).

(3064) Sayles, C. I., Gortner, W. A., and Volz, F. E., "Frozen Food Packaging--a Preliminary Study of Cavity Ice." Food Freezing 1, No. 9, 430-3,

457-8 (1946). - Temperature differences and fluctuations cause the formation of cavity ice (ice in air spaces) in packages of frozen foods. It always forms on the coldest surface of the container and seems to be increased by either radiation or conveotion of heat. It may be eliminated or reduced by enclosing the food products in a radiant foil, placing packages directly above the cold surface, or by preventing cycling of temperature.
R. A. 2, 40 (1947).

(3065) Scattolin, L. L., "The Cold Locker Serves More and Better in the Interest of Food Preservation." Humus 2, No. 7, 15-6 (1946).

(3066) Schaal, W., "Looker Course at Ohio State." Frozen Food Indus. 2, No. 7, 14, 33-5 (1946). - A short college course for locker operators has been inaugurated at Ohio State University. All phases of processing are emphasized, from judging live animals and raw produce, to the actual freezing and subsequent oooking of foods. It is planned to oontinue the course.
B. J. A.

(3067) Scheid, M. V., Lucas, P. S., and Trout, G. M., "Frozen Cream as a Source of Fat in Ice Cream." Mich. Agr. Expt. Sta. Quarterly Bull. 25, No. 2, 125-32 (1942).

(3068) Schermerhorn, L. G., "Comparing Quick Frozen Varieties of Lima Beans." N. J. State Hort. Soc. Hort. News 27, 1843 (1946).

(3069) Schneiter, R., "Microbiological Examination of Frozen Egg Produots." J. Assoc. Off. Agric. Chem. 23, 613-17 (1940). - Revisions in previously described methods are recommended.
Br. A. BIII, 128 (May, 1941).

(3070) Schneiter, R., Bartram, M. T., and Lepper, H. A., "Bacteriological and Physical Changes Occurring in Frozen Eggs. Influence of Defrosting and Prolonged Storage on Bacterial Count and on Odor." J. Assoc. Offic. Agric. Chem. 26, 172-82 (1943). - Eggs of good and bad quality were prepared, frozen, and stored as in normal oommeroial procedure, in order to ascertain the bacterial and physical changes occurring in them. It was found that good quality frozen eggs can be completely thawed and refrozen twice without any significant change in bacterial ocunt, appearanoe, or odor, and oould well withstand six years' storage. Poor quality eggs do not stand up for more than a few months unless maintained at -20° F., and on thawing are subjeot to rapid decomposition. A rapid reduction in the number of viable mioroorganisms is noted in frozen egg whites due to the presence of the bacteriolidal lysozyme. Total plate count and the coliform index are roughly parallel, and may each serve as a reliable index of original quality of eggs.
B. J. A.

(3071) Schrader, A. L. Varieties of Fruits Recomended for Freezing in Maryland. Md. Agr. Col. Ext. Mimeog. No. 25., 1946. 1 page.

(3072) Schreiber, M. L., Vail, G. E., Conrad, R. M., and Payne, L. F., "The Effect of Tissue Fat Stability on Deterioration of Frozen Poultry," Poultry Sci. 26, No. 1; 14-9 (1947). - Day-old chicks were fed a basic diet

until 14 weeks old, then fed 4 supplementary products-- 3% wheat germ oil, 2% sardine oil, 10% dehydrated alfalfa leaf, and 8 mg. ascorbic acid per lb.--for periods of 7 and 14 days to determine the effect on the stability of the fat. None of the supplements increased the stability of body fat. Alfalfa produced the most stable fat when measured by the induction period but least stable when measured by the changes in flavor and degree of fat oxidation during frozen storage. Alfalfa or fish oil greatly decreased stability of fat of the carcasses during frozen storage; wheat germ oil and ascorbic acid reduced stability slightly.

R. A. 2,101 (1947).

(3073) Schwab, J., "The Frozen Food Industry in the Pacific Northwest." Food Freezing 2, 260-63, 310-11 (1947). - Brief history of the industry since 1910. The locations of present production and processing areas in the region are shown by maps. R. A. 2, 200 (1947).

(3074) Schwartze, C. D., "Types of Seeds Important in Frozen Vegetable Quality." West. Canner & Packer 31, No. 3, 108-9, 111 (1939).

(3075) Scott, F. W., "Planning and Building A Master Freezer Plant." Sou. Power & Ind. 63, No. 11, 54-6, 64 (1945). - Low first and operating costs of a WFA freezing plant in Nashville (Tennessee) assure its continued operation in the postwar period.

R. A. 1, 97 (1946).

(3076) Scott, G. C. and Belkengren, R. O., "Importance of Breeding Peas and (Golden Sweet) Corn for Nutritional Quality." Food Res. 9, 371-76 (1944). - Different varieties of peas contain carotene 1.09-5.39, vitamin C 192-329, thiamin 1.37-4129, niacin 27.7-35.1, and riboflavin 1.81-2.57 10^{-6} g./g. Sweet corn contains carotene 0.81-4.87, vitamin C 99-270 10^{-6} g./g. An increase in carotene and a decrease in vitamin C with increasing maturity and considerable differences in the vitamin contents of different hybrids of the same degree of maturity are observed. No correlation between the depth of color and the carotene content of raw or canned sweet corn is found.

Br. A. BIII, 61 (Mar., 1945).

(3077) Scott, G. W. "The Selection of Varieties for the Production of Frozen Fresh Vegetables." Fruit Prod. J. 26, No. 12, 112-3 (1946). - The varietal factor may influence plant operation and quality control in 3 ways: (1) if the variety used is not of high quality in the raw state, the final product cannot be of high quality, (2) if the variety is not adaptable to freezing preservation, the product may not be acceptable to the consumer, and (3) it may affect the cost of preparing the raw product for freezing. The problem of choosing the proper variety is illustrated by the following examples: (1) all varieties are not equally productive at all seasons and in all areas, (2) all varieties are not equally adaptable to mechanical harvesting, and (3) special varieties and special cultural requirements may be necessary to produce a particular form of raw product demanded by the operating department.

R. A. 2, 93-4 (1947).

(3078) Scott, L. E. and Mahoney, C. H., "Quality Changes During Storage of Consumer Packages of Sweet Corn and Lima Beans." Proc. Amer. Soc. Hort.

Sci. 47, 383-86 (1946). - During storage of sweet-corn ears in cellophane-window, wax-impregnated, cardboard boxes holding 6 ears, at temperatures from -17.5 to 7.8° for 2 to 13 days, there was a considerable drop in the sugar content, the drop increasing as the time of storage was lengthened and with the rise in storage temperature. Precooling of the ears in ice-cold H_2O (1.1°) for 20 minutes before packaging somewhat reduced the subsequent sugar losses. Shelled lima beans similarly packed showed, when stored at -2.2°, a 30 per cent loss of ascorbic acid in 11 days. The losses were only slightly greater at higher storage temperature but after storage for 4-6 days at 1.7° or 2.2° the beans were no longer of acceptable quality. Precooling treatments before packaging had little effect on losses of ascorbic acid, but increased the storage life of the beans at 0° and 1.7° C. slightly. Beans stored in sealed, airtight packages retained their color and remained free from slime, but developed a sweetish odor which was still noticeable after cooking.

Br. A. BIII, 59 (March, 1947).

(3079) Scurti, F., "Frozen Fruit Products." R. Ist. di Sper. per la Chim. Agr. Ann. 15, Pt. A, 137-65 (1941-45).

(3080) Seabrook, C. C., "The Future of the Frozen Food Industry." Fruit Prod. J. 25, 235-36, 253-54 (1946); Southern Canner & Packer 7, No. 4, 16-17, 26 (1946); West. Frozen Foods 7, No. 11, 3-5 (1946); Canner 102, No. 16, 14-16 (1946).

(3081) Self, V. F., "Proper Air Distribution is Necessary in Four Principal Phases of Frozen Food Industry." Food Packer 27, No. 10, 60, 62, 64 (1946); Frosted Food Field 3, No. 2, 20-21 (1946).

(3082) Senn, G., "What a Preserver Wants in Frozen Fruits." Quick Frozen Foods 9, No. 9, 88-89 (1947). - Preservers are most desirous of eliminating adulterated cold packs, and recommend that careful chemical and microbiological analyses be run on samples from the pack to insure better quality products.

B. J. A.

(3083) Shellabarger, L. C., "Frozen Food Locker Plants (Iowa)." Iowa Ybk. Agr. 46, 120-22 (1946). - The industry.

(3084) Shelor, E. and Woodroof, J. G., "A Promising Pre-cooked Frozen Food." Quick Frozen Foods 9, No. 1, 136-37 (1946). - Formulas for preparing various forms of that highly popular Southern dish, Brunswick stew, are given, for high and low meat contents both mild and highly seasoned. Freezing is the only successful method of retaining its flavor and may be easily accomplished at -10° F. Best storage conditions are obtained at -10 or 0° F. when the stew is packaged in an aluminum foil bag.

B. J. A.

(3085) Sherman, R. W. Cold Storage Locker Plants in Ohio. Ohio Agr. Expt. Sta. Bulletin No. 668, 1946. 32 pages.

(3086) Sherman, V. W., "Electronics in the Food Industry." Proc. Inst. Food Technologists, 1944, 87-101. - Electronic heat is a fundamental mechanism

without counterpart in the world of physics. It is the one form of heat capable of producing a rapid and completely uniform temperature rise throughout a food mass; it is more than competitive; it is actually cheaper than many other forms of heat. Commercial industrial electronic units designed for operation by unskilled help are available. Electronic heat not only aids established heat process, but is creating completely new ones to win and hold the food markets of the future.

B. A. 20, 54 (1946).

(3087) Sherman, V. W.,"Electronic Heat in the Food Industries." Food Indust. 18, No. 4, 506-09, 628-30 (1946). - Frozen foods can be defrosted by electronic heat with a minimum of bacterial multiplication. Bread, cookies, and meat can be cooked quickly. Generators, maintenance, and operating costs and applications of electronic heat are discussed.

B. A. 20, 1621 (1946).

(3088) Shimer, S. R., Yeager, A. F., et al. The Effects of Quick-Freezing on the Vitamin Content of Strawberries. Univ. N. Hamp. Agr. Exp. Sta. National Coop. Project No. I, 1944. 6 pages. - Objective of study was to note effect of quick-freezing and 6 months' storage on ascorbic acid content of N. Hamp. strawberries. Moisture determinations were run, finally using a convection oven at 68-72° for 20 hours. Ascorbic acid content was determined by Morrell method using a Klett-Summerson photoelectric colorimeter. June berries showed more ascorbic acid than did July-picked. Berries were quick-frozen at -10° C. and held at 0 to 10° C. for 2 to 6 months, all varieties showing progressive losses in ascorbic acid. Color did not hold up well, but palatibility tests were good even after 6 months.

B. J. A.

(3089) Shimer, S. R. and Yeager, A. F., The Effects of Quick-Freezing on Vitamin Content of Red Raspberries. Univ. N. Hamp. Agr. Exp. Sta. National Coop. Project No. II, 1944. 4 pages. - Moisture, ascorbic acid, and carotene tests were run on all samples of red raspberries frozen. Ascorbic acid was determined by the Morrell method using a Klett-Summerson photoelectric colorimeter, and carotene by the Moore-Ely method. Sixteen varieties were analyzed each from 1-4 times during season. Changes produced by storage at room and refrigeration temperatures and by 12-hour thawing of frozen product were noted. Carotene studies showed great irregularity. Palatability tests were not good after storage.

B. J. A.

(3090) Shimer, S. R., Yeager, A. F., et al. The Effects of Canning and Quick-Freezing on the Vitamin Content of Blueberries. Univ. N. Hamp. Agr. Exp. Sta. National Coop. Project No. III, 1944. 4 pages. - Berries were obtained 20 hours after picking and tested for "fresh", others being stored for 16 hours for analysis, and the rest quick-frozen at -10° C. Little difference was noted between the ascorbic acid content of canned and frozen berries, although berries stored at 41° for 16 hours lost 75% of the ascorbic acid found in "fresh" berries. Frozen berries maintained good flavor, but a tougher texture developed.

B. J. A.

(3091) Shimer, S. R., Yeager, A. F., et al. The Effects of Freezing and Dehydration on the Carotene Content of Blue Hubbard and Butternut Squashes.

Univ. N. Hamp. Agr. Exp. Sta. Natl. Coop. Project No. IV, 1944. 3 pages.- Samples of squash were prepared for the carotene test by grinding in an electric food chopper, then steam blanched, the peroxidase test determining length of blanching period. Then quick-freezing was done at -10° C. and squash was stored at 0 to 10° C. Carotene test were made by the Moore-Ely method immediately after blanching and after 6 months' storage. Carotene appears to become "concentrated" when kept in cold storage.

B. J. A.

(3092) Shrewsburg, C. L., et al., "Effect of Finish and Ripening Period of Beef on Keeping Quality of Meat Quick-Frozen and Stored for Fifteen Months." J. Animal Sci. 4, 151-57 (1945). - Neither the finish of the steers used nor the ripening period of the carcasses had any effect on the quality of "quick-frozen" beef after storage at 0° F. for 15 months. Chemical changes were small and insufficient to indicate spoilage; greatest changes recorded were increases in the NH_3-nitrogen of the muscles and in the peroxide and free fatty acids of the fat. A slight deterioration in quality was indicated by palatability tests, and the tensile strength of the muscle showed small increases. Appreciable histological changes in the muscle fibres were not demonstrable.

Br. A. BIII, 155 (July, 1946).

(3093) Sidaway, E. P., "Light-bending Properties of 'Drip' From Stored Halibut." Progr. Repts. Fish. Res. Bd., Canada, No. 49, 3-5 (1941). - The n of the "drip" from fresh or frozen halibut is of little use as an index of the freshness of the fish. This may be due to the difficulty of obtaining uniform samples of the "drip".

Br. A. BIII, 52 (Febuary, 1942).

(3094) Shuey, G. A. House Preparation of Sirup for Freezing Peaches and Other Fruits. Tenn. Agr. Col. Ext. Spec. Ciroular No. 241, 1945. 2 pages.

(3095) Shuey, G. A. Suggestions on the Preparation of Sirups for Commercial Freezing Preservation of Peaches. Tenn. Agr. Col. Ext. Spec. Circular No. 242, 1945. 2 pages.

(3096) Shuey, G. A. Home Freezing of Fruits and Vegetables. Tenn. Agr. Expt. Sta. Inform. Circular No. 77, 1947. 1 page.

(3097) Siemers, G. F., "To Blanch or Not to Blanch-- Frozen Apricots, Peaches." Frosted Food Field 2, No. 1, 13, 16 (1946). - Reports were made on the use of l-ascorbic acid (vitamin C) as an antioxidant to prevent browning and flavor loss. Unblanched freestone peaches treated with ascorbic acid were in excellent conditon. Highly blanched peaches, not treated with the vitamin, were also in good condition, but they were not considered frozen fresh fruit and resembled canned fruit. Since apricots brown very quickly if not treated, they must be immediately blanched or treated with asoorbic acid, which produces a better product than does a high degree of blanching.

M. B.

(3098) Sigurdsson, G. J., "Studies on the Storage of Herring in Refrigerated Brine." Proc. Inst. Food Tech., 91-114 (1945). - The storage of herring in

refrigerated brine at 32°F. or below whenever the catch exceeds the sardine plant's capacity was shown to be superior to either icing or storage in cold air. The effect of various handling methods was judged visually, by determining volatile acids, tyrosine values, amino-nitrogen and peroxide values, and by steaming to simulate sardine-canning procedures. The longer the storage period required, the lower the temperature of the brine should be and the higher the brine concentration. Freezing was objectionable, however, as slow or partial freezing softened the fish. In general, salt equilibrium was reached in about 5 days. The concentration of salt in the fish seldom reached complete equilibrium with that in the brine. Initially the moisture content of the fish decreased; then it increased and with dilute brines exceeded the original moisture content. The effect of the ratio of volume and concentration of the brine to the weight of the fish, desalting time required, and the salt and moisture content of commercial packs of sardines were also investigated.

C. A. 40, 6702 (1946).

(3099) Simpson, J. I., "Frozen Foods for Institutional Use." J. Am. Dietetic Assn. 22, No. 8, 661-64 (1946). - The quality of some frozen foods marketed in institutional-size packages is definitely lower than that of the corresponding food marketed in home size packages. The cause and cure are probably one of price. A satisfactory grading system is much needed, as well as approved procedures for preparing frozen foods for consumption.

R. A. 2, 37 (1947).

(3100) Singruen, E., "Frozen, Ready to Bake." Am. Baker 13, No. 8, 14-16 (1945). - The successful development of frozen bakery products in 3 retail stores in the Chicago area is reported. Problems discussed include production, packaging, delivery, storage, and merchandising. The importance of experimentation and research for the attainment of the highest quality product is emphasized.

R. A. 1, 40 (1946).

(3101) Sjetne, O., "Freezing of Food. (Fruits and Vegetables)." Meieriposten 35, 150-56, 174-77, 193-95 (1946).

(3102) Sjetne, O., "Utilization of Locker Plants in Norway." Meieriposten 36, 267-76 (1947).

(3103) Slack, J. C., "TVA Research and Agricultural Engineering Activities." The Research Engineer 9, No. 2, 3,4, 21-23 (1947). - TVA has for several years been engaged in a wide-spread program of research on frozen foods and industrial assistance to the frozen foods industry. The initial program, undertaken jointly with the University of Tennessee, laid the basis for a thriving Valley commercial freezing industry. In 1938, a joint program of microscopic study of frozen foods was undertaken with the Georgia Agricultural Experiment Station, other units of the University System of Georgia being brought into an enlarged research program in 1939. Much work has been done to assist the U. S. Department of Agriculture in construction of grade standards. The Agricultural Engineering Department of the University of Georgia is doing cooperative research on engineering aspects of community food processing plants (locker plants). At the Engineering Experiment Station of the Georgia School of Technology (see Kethley, T. W., The Research Engineer 8, No. 12, 11-16 (1946)), cooperative research is being conducted

for the purpose of developing more effective methods of freezing preservation (part of this effort is concerned with this literature search and its predecessor). The industry development and process commercialization phase of the TVA program is centered at TVA's mobile pilot plant on barges, at present near Spring City, Tennessee. This activity is conducted for the purpose of encouraging development and efficient operation of rural plants by supplying engineering information and technical guidance based on studies conducted by TVA and Valley institutions.

B. H. W.

(3104) Smart, H. F., "Microbiological Studies of Frozen Pack Mushrooms." Canner 78, No. 17, 10-12 (1934).

(3105) Smith, C. F., "Quick-Frozen Poultry--Its Future Possibilities." U.S. Egg & Poultry Mag. 52, 292-93, 318-20 (1946).

(3106) Smith, E., "Handling of Long Distance Shipments of Frozen Foods." Food Freezing 1, No. 7, 331-33, 356-57 (1946). - Commodity temperatures as high as 24°F. were observed in rail shipments. Contributing causes to high temperature during transit are high loading temperature, interference with air circulation in cars, improper storage, and delays in handling. Cars with overhead bunkers or air circulating fans are much superior to standard cars.

R. A. 1, 219 (1946).

(3107) Smith, G. H., "How Big is the Home Freezer Market?" Frozen Food Indus. 2, No. 9, 8-9, 39-40 (1946).

(3108) Smith, H. R. and Smith, K. R., "Effect of Freezing on Utilization of Canned Foods." Food Res. 9, 66-75 (1944). - 35 varieties of canned foods were frozen at - 18°C. for 7 days, and replicates were thawed and refrozen or cooked in different ways. Certain products, particularly asparagus, showed some loss of drained weight due to freezing. Slow thawing by standing overnight at room temperature gave the best results. Freezing changed the physical nature of the cooked starch in such foods as corned beef hash, cream style maize, and concentrated soups. Instead of a thick visoous mass it became spongy and granular, and a clear liquid separated quickly from the mass on standing. Heating in an open pan restored the original texture completely. The ends of most solidly frozen cans were slightly bulged due to expansion of the contents.

N. A. R. 14, 240-41 (1944).

(3109) Smith, J. A., "Plans and Calculations for Three Typical Locker Plants." Refrig. Eng. 51, No. 3, 215-19, 274 (1946). - Author suggests practical floor layouts of frozen food locker plants with 120 lockers, 355 lockers, and 1008 lockers, and outlines methods of figuring refrigeration load and selecting proper condensing units and evaporators for them. Abstracted from Chapter 31 of forthcoming Applications Volume of "Refrigerating Data Book."

E. I. 1946, 231.

(3110) Smith, W. S., "Insulation in the Low Temperature Freezer Plant." Food Freezing 1, No. 7, 337-339, 360 (1946). - A digest of current practices

in freezer plant insulation with descriptive comparisons of the properties of reflective, fill, blanket, and block insulations. The major properties discussed are durability, efficiency, sanitary properties, flammability, structural adaptability, and initial cost.

R. A. 2, 16 (1947).

(3111) Sommer, H. H., "Eliminating Tallowy Flavor Defects in Stored Frozen Cream." Ice Cream Review 19, No. 11, 36 (1936).

(3112) Sommer, H. H., "Development of Oxidized Fat Flavors in Stored Frozen Cream." Ice Cream Review 20, No. 7, 62-63 (1937).

(3113) Sorber, D. G., "Freezing Baked Beans and Other Prepared Foods." Quick Frozen Foods 5, No. 8, 18 (1943).

(3114) Sorber, D. G., "The Maximum Fruit Flavor in Ice Cream." Sou. Dairy Prod. J. 41, No. 4. 29, 36-40 (1947); Ice Cream R. 30, No. 9, 50 (1947); Ice Cream Field 49, No. 4, 24, 61-62 (1947). - Maximum flavor of more than 20 kinds of fruits for use in flavoring ice cream, sherbets, ices, and fountain drinks, and for sundae toppings can be preserved by freezing. Details are given for preparing apricots, avocados, bananas, blackberries, dewberries, cantaloupes, cherries, dates, guavas, nectarines, oranges, peaches, pineapples, red raspberries, and strawberries for freezing. The fruit is usually frozen at -20° F. and stored at 0° F. or below. Copper, iron, tin, and zinc must not be used in equipment or containers in direct contact with the product and all possible air should be excluded from the containers. Fruit should be defrosted at 40° F. before being added to the mix.

R. A. 2, 178 (1947).

(3115) Soriano, S. and Soriano, A. M. De, " Microbiological Study and Control of the Presence of Insects and Foreign Particles in Dehydrated and Frozen Eggs." Ass. Argentina de Dietologia Rev. 3, 222-27 (1945). - Thirteen samples of dried egg powder, 4 of dried egg scales, and 3 of chilled eggs were examined microbiologically. In general, the scales showed heavier contamination than the powder with total and proteolytic bacteria, and chilled eggs still higher. Lipolytic bacteria were present in approximately the same amounts in both forms of dried egg, but were not found in the chilled eggs. Yeasts and fungi were much higher in egg scales than in either egg powder or chilled eggs. Coliform bacilli were found in 2 samples of chilled eggs and Salmonella in 1 sample, but no bacteria of these groups were found in any of the dried eggs, either powder or scales. In none of the 20 samples examined were there found any strict anaerobes, streptococci, or haemolytic staphylococci. Of 8 samples of egg powder examined, all contained fragments of insects, and 3 also contained other foreign bodies. No fixed standards have yet been accepted for such products, but according to the suggestions made by the U. S. Quartermaster Corps, 55 per cent of the samples would have been rejected.

N. A. R. 16, 29 (1946).

(3116) Specht, F. W., "Are Pre-Packaged Frozen Meats Ready for the Retailer?" Food Indus. 18, 1192-93, 1336 (1946).

(3117) Spitz, L. and Derby, T., "Precooked Frozen Foods on a Production Line Basis." Food Ind. 19, No. 7, 930-32, 1032-34 (1947). - The first major step in the production of precooked frozen meals is the sychronization of cooking and assembling operations. Beef, lamb, veal, and poultry have all been frozen successfully, but pork as yet cannot be cooked and frozen well. Mold trays are used and they pass on a conveyor belt with rack trucks through a blast freezer tunnel at -20° F. For best freezing results, careful foundation formulae are developed for the preparation of each dish. Pilot runs are made of each item in order to make fine adjustments in the formula, time, and temperature, etc. Electronic sterilization of the finished product is recommended as the final step.

B. J. A.

(3118) Sprague, R., "New Freezing Plant Captures Lush Freshness of Ozark Fruits and Vegetables." Ice & Refrig. 111, No. 4, 17-21 (1946). - At Van Buren, Arkansas.

(3119) Sprague, Roger, "Self-powered Freezing Plant." Refrig. Ind. 3, No. 11, 36-38 (1946); Frosted Food Field 3, No. 5, 3, 8 (1946); Ice and Refrig. 111, No. 4, 17-21 (1946). - The Van Buren, Arkansas, freezing plant is natural gas engine driven, including auxiliary equipment and lighting. Tunnel type air blast freezers operating at -35° F. have a capacity of approximately 6000 pounds per hour of products. The three 0° F. storage rooms hold a maximum of 35 carloads of frozen foods.

R. A. 2, 43 (1947).

(3120) Sprague, Roger, "Woodstock Freezing Plant most Modern in Ontario." Can. Refrig. J. 13, No. 3, 8-9 (1947); Ice & Refrig. 112, No. 3, 23-26, 78 (1947). - Floor area of 35,000 sq. ft. includes 8 rooms at 30° F.; 3 at 0° F.; 1 at -30° F.; 3 air conditioned rooms at 60-64° F. Freezing room capacity is 10,800 pounds daily, using air blast at -30° F. One of the rooms kept at 0° F. is refrigerated by the jacket method which wraps a blanket of cold air around the room by means of channels and passages exterior to the storage space. Each temperature zone is separately and automatically controlled.

R. A. 2, 200 (1947).

(3121) Stahl, A. L., "Preservation of Citrus Juices and Pulps." Fla. Agr. Exp. Sta. Annual Report, 109 (1939). - A recent development for preparation of concentrated citrus juices by partial removal of the water through freezing shows that the products retain color, flavor, and 85% of the original ascorbic acid content after a 2-year storage period at a temperature of 0°F.

B. J. A.

(3122) Stahl, A. L., "Freezing Citrus Hearts Saves Natural Goodness; Taste, Color, Texture, and Vitamins Unchanged Through Quick Freeze Preservation Methods." Fla. Grower 53, No. 12, 5, 8 (1945).

(3123) Stahl, A. L., "Freezing Retains Flavors." Citrus Leaves 26, No. 2, 16-17 (1946). - Best results in preparing grapefruit hearts for commercial packaging were obtained when precooled fruit was subjected to slight vacuum immediately after peeling; the vacuum was broken with CO_2 or N, and the fruit was packaged before reaching room temperature. Samples prepared in their own juice or with 20-30% sirup containing both sucrose and glucose were superior to those dry-packed. Of several antioxidants tested, only ascorbic acid showed any retarding effect on discoloration. Fruit that was

quick frozen at -20° F. kept better than those frozen at higher temperatures. A storage temperature around 0° F. proved better than one around 15-20° F. C. A. 40, 2237 (1946).

(3124) Stahl, A. L. and Jordan, M. B., "The Concentration of Citrus Fruit Juices by Freezing." Food Freezing 1, No. 8, 375-77 (1946). - Concentrated citrus juices were prepared by a modification of the Gore process of concentration by freezing. Juice was extracted by slowly reaming the fruit for minimum contamination by peel oil; strained on shaker screens to separate rag and juice, and to remove most of chromatophores; deaerated; precooled and frozen either in cans or in continuous freezers. The solidly frozen juice was put through an ice shaver or crusher, then fed into a high speed basket centrifuge in which the partially concentrated juice was separated. The larger the iced crystals, the better was the separation. The freezing and centrifuging cycle was repeated until the desired degree of concentration was obtained; each freezing cycle was repeated to triple the concentration. The concentrate was then deaerated and brought to desired degree of concentration by blending with freshly extracted juice or over-concentrated juice, and incorporated with juice sacs saved from the second screen of the shaker-strainer. A 44° Brix concentrate was found best for freezing at 0° F. Stored at -5° F., the concentrate was solid; at 5° F., soft solid; at 15° F., liquid. Its vitamin C content was best retained at -5° F., but flavor retention was satisfactory throughout the range of -5 to 15° F. The loss in solids on freezing-centrifuging was 2% in can freezing, and 5-10% in continuous freezing. R. A. 2, 28-9 (1947).

(3125) Stahl, A. L., "Tests Prove Best Methods of Citrus Heart Freezing. I-II." Quick Frozen Foods 8, No. 6, 59; No. 7, 94 (1946). - Tests show that any heating of citrus juice or sections is detrimental to their appearance and flavor, but freezing preserves them satisfactorily when used in conjunction with deaeration, vacuum, carbon dioxide, or nitrogen gas pack. The addition of 0.2% ascorbic acid either in 30% sirup or mixed dry with the juice aided the retention of fresh flavor, even after prolonged thawing. Obtaining suitable containers for holding the gases or vacuum was a major problem. R. A. 1, 154 (1946).

(3126) Stamberg, Olof E. and Bolin, D. W., "Frozen Vitamin Standards." Indust. and Engineer Chem., Analyt. Ed. 17, No. 10, 673 (1945). - Preparation of accurate standards for vitamin analysis is time-consuming, and in most laboratories fresh standards are prepared every few days; riboflavin solutions undergo photolysis, and thiamine in dilute acid is unsafe to use if it has been stored more than a few days. The use of frozen vitamin standards is both accurate and time-saving. A large number of vials can be prepared and used over a long period of time. This method can perhaps be used for other vitamins also. B. A. 20, 884 (1947).

(3127) Stampa, G., "Conservation of Fruits and Vegetables by Rapid Freezing." Internatl. Inst. Agr., Internatl. Rev. Agr. 35, 153T-163T (1944).

(3128) Stansby, M. E. and Dassow, J. A., "Preparing Fish for Freezing." Fishing Gazette 59, No. 12, 24 (1942).

(3129) Stark, F. C., Jr. Varieties of Vegetables Recommended for Freezing in Maryland. Md. Agr. Col. Ext. Mimeog. No. 25A, College Park, Md., 1946. 1 page.

(3130) Starr, G. V. A Study of the Moisture Loss of Some Vegetables Quick Frozen, before Packaging, in a Domestic Freezer. Unpublished M. S. Thesis, Dept. of Home Economics, Pennsylvania State College, 1945.

(3131) Stateler, E. S., "It Peels--Blanches--Cooks." Food Ind. 19, No. 8, 1053-55 (1947). - Essentially, this new food processing unit is a pressure steel tube fitted with steam inlet orifices, pressure gages and vents, gasketed pistons, with a capacity of 0.8 cu. ft. between these pistons. It has been used to blanch beets, carrots, white and sweet potatoes, and beans, as well as to peel vegetables, shell coconuts, and cook salmon. Its blanching capacity is 5-7 tons per hour. The operation is quick, economical, versatile, and is efficient (even in crowded areas, due to its compactness).

B. J. A.

(3132) Steeves, T. A. and Cook, W. H., "Reduction of Spatial Temperature Variations in Air-cooled Cold Storage Rooms. I." Can. J. Research, Sec. F, 23, No. 4, 253-62 (1945). - The presence of boxes and exothermic lading increases the spatial temperature variations in a refrigerated room. If air is forced through the stacks by blocking aisles, variations approach values prevailing in the empty room. Dunnage spacing also reduces temperature variations, but no significant difference was found between spacings varying from 5/16 to 2 inches.

R. A. 2, 44 (1947).

(3133) Stegner, M., "Freezable Formulas." Quick Frozen Foods 8, No. 7, 62, 117 (1946). - Frozen canapes.

(3134) Stein, A., "Rise of the Frozen Food Industry." Conf. Board Industry Record 4, No. 10, 1-6 (1945).

(3135) Steining, F. H., "Postwar Design and Development of the Domestic Refrigerator and Home Freezer." Refrig. Eng. 49, 17-20 (1945). - The various familiar demands for improvement of the domestic refrigerator are rated in this order: more flexibility, increase in hydrator space, and more low temperature space. The use of air insulated shipping containers to receive food at -140° F. is also mentioned.

R. A. 1, 25 (1946).

(3136) Stentzel, E. J., "What Happens after Frozen Foods Leave the Packing Plant?" Quick Frozen Foods 9, No. 4, 74-75, 112 (1946). - Until there are adequate transportation methods, distributing practices are improved, proper refrigerated dispensing equipment is available, and until the ultimate consumer is educated in the proper care and handling of frozen foods, then only can assurance be had that there will be a consistent flow of quality frozen foods.

B. J. A.

(3137) Stetson, P. C., "Freezing Cattle on the Range." Quick Frozen Foods 8, No. 5, 100, 104 (1945). - It is suggested that quick freezers be located near the cattle range in order to get animals in their prime condition and then store the meat until demand warrants its release. Refrigerated trucks can be used to ship the frozen beef.

B. J. A.

(3138) Stewart, M. M., "Effect of Exposure to Low Temperatures on the Number of Bacteria in Fish Muscle." J. Soc. Chem. Ind. 53, 273T-78T (1934). - A review is made of experimental results gathered by various workers. The authors themselves inoculated haddock with various marine bacteria and incubation periods were allowed to elapse. Tests were made of the cultures, using sterile physiological saline on the emulsified muscle (this at ordinary temperatures). Then tests were repeated using temperatures of -12, -6 and -2° C. The storage at -12° C. was found to be most effective in lessening the number of organisms present. Bacteria still grew rather well when the fish was stored at -2° C. Likewise, while growth was inhibited at -6° C., certain chromogenic bacteria thrived, thus altering color of the fish.

B. J. A.

(3139) Stone, J. F., "Cold Storage Rooms Converted to Quick Freezers." Food Indus. 19, No. 4, 462-63 (1947). - Increased demand for quick freezing capacity can frequently be met by converting available cold storage rooms. An important factor in conversion is the choice of the proper type and amount of insulation.

R. A. 2, 162 (1947).

(3140) Stone, W. G., "Freezing Around the Calendar." Quick Frozen Foods 9, No. 4, I-II (1946). - The A. D. Atterbury Co., Yuba City, Calif., is discussed, as regards the year-round operation of the plant. The production line is arranged as follows: Jan.-Feb., brussels sprouts and broccoli; Feb.-Mar., cauliflower; Mar.-Apr., spinach; Apr.-May, peas; May-June, cherries; June-July, apricots; July-Aug., plums and figs; Aug.-Sept., peaches and figs; Aug.-mid-Oct., green lima beans; Oct. thru Dec., apples; Sept. thru Dec., brussels sprouts.

B. J. A.

(3141) Stout, G. J. Freezing Foods on the Farm. Ia. State Col. Agr. Ext. Circular No. 280, 1945. 12 pages.

(3142) Stout, G. J., "How to Make Money with Farm Freezers." Farm J. 70, No. 5, 20-1 (1946). - Home freezing of farm produce is discussed briefly.

B. J. A.

(3143) Stout, G. J., "Frozen Fruit Cocktail." South. Canner & Packer 7, No. 2, 17, 36 (1946).

(3144) Stout, G. J. The Home Freezer Handbook. N. Y., Van Nostrand Co., Inc., 1947. 345 pages.

(3145) Stroup, H. B., "Freezer Steps up Sales; This New Selling Method Makes Broiler Business Profitable for Veterans." Poultry Tribune 53, No. 5, 10, 33-34 (1947). - Discusses various aspects of the industry.

(3146) Stuart, L. S. and Sidler, C. E. Report on Comparative Studies made as to the Suitability of Various Types of Containers for Use in Freezing Egg Products. Chicago, Ill., National Egg Products Assn., 1942.

(3147) Stuart, L. S., Goresline, Harry E., et al, "Effect of Storage Temperature on Bacteria in Egg Powder." Food Industries 17, 1174-75, 1266,

1268, 1270, 1272, 1274 (1945). - At temperatures of 86° F. or lower, the rate of bacterial death inspray-dried whole-egg powder of high sanitary quality was normal for bacterial populations of dry material. Above 86° F there was a secondary accelerated death rate. In egg powders of low sanitary quality, there was a secondary accelerated death rate at temperatures as low as 86° F. These secondary death rates were attributed to extra-cellular factors resulting from chemical changes in the powder itself. Evidence of advanced progress in bacterial cell catabolism appeared in powder of high sanitary quality when stored more than 2 weeks at 86° F. or 24 weeks at 50° F. With powders of low sanitary quality those changes appeared after storage for longer than 2 weeks at a temperature of 75° F. or 12 weeks at 50° F. or higher, or 24 weeks at 32° F. The highest temperature at which an average quality egg powder could be stored for 48 weeks without showing pronounced evidence of bacterial cell catabolism was about 45° F. A temperature of 32° F. appeared safer.

C. A. 40, 1949 (1946).

(3148) Sullivan, G. H., "Frozen Foods and the Department Store." Mod. Packaging 20, No. 4, 108-12 (1946); Southern Canner & Packer 8, No. 6, 12-5; 18 (1947). - Using information furnished by the Frozen Food Foundation, department stores have begun to cut themselves in on a portion of the potential 10 billion dollar frozen food retail sales industry. Packaging is at present the most important item (assuming quality remains high) in advancing sales both in meats, fish, frozen precooked foods, baked goods, and staples. Convenience in packaging must be at a maximum. An all-purpose, one-piece, impermeable, economical package will be ideal, especially if the product could be heated itself and served in the original form. Tin freezing packages will undoubtedly be tested for this purpose in 1948.

B. J. A.

(3149) Sunderlin, G. L. and Collins, O. D., "And now Quick Frozen Pies, Cookies, Cakes, and Biscuits." Quick Frozen Foods 3, No. 7, 13, 43-4 (1941).

(3150) Sunderlin, G., "Into the Freezer Instead of the Oven." Quick Frozen Foods 9, No. 3, 148 (1946). - Recipes and some general discussion of frozen baked goods and their uses are given.

B. J. A.

(3151) Sweetser, H. P., "Gross Weights vs. Net Weights on Frosted Foods." Ice & Refrig. 100, No. 3, 229-30 (1941). - Gross and net weight figures for frosted foods are discussed in relation to the billing of storage charges.

B. J. A.

(3152) Swenson, T. L.; "Electronics in the Food Industry; Used in Dehydrating Foods and for Thawing Frozen Foods." Electronics 20, No 2, 206 (1947). - According to experiments, dielectric heating would be preferred in dehydrating only when the material to be dried is not subject to damage by heat, although this method is faster than oven drying. The time for thawing by dielectric heating was one-thirtieth that for conventional methods, giving little opportunity for spoilage.

A. S. C.

(3153) Swink, E. T.; "Frozen Foods for the Farm Family." South. Planter 108, No.5, 18-9, 37 (1947). - Frozen food locker plants in Virginia are discussed especially.

B. J. A.

(3154) Tanner, E. C., "The Development of a Home Freezer." Refrig. Eng. 51, 321-23 (1946). - Ice cream cabinets are not suitable for use as home freezers because (1) they have a capacity for holding foods already frozen rather than for freezing them, (2) they are designed to be opened many times a day, (3) storage temperatures are from 5-12° F., and (4) defrosting is difficult. Reliability, pleasing appearance, simplicity, and convenience of use are important features in home freezers. A vertical type (front opening) cabinet with a freezer compartment which has 5 refrigerated surfaces as walls provides fast freezing of products, gives maximum utility, uses minimum floor space, and has negligible air spill losses.

R. A. 1, 157 (1946).

(3155) Tanner, F. W. and Wallace, G. I., "Effect of Freezing on Microorganisms in Various Menstra." Soc. Expt. Biol. and Med. Proc. 29, 32-4 (1931). - In a continued investigation of the behavior of microorganisms in commercial frozen fruits and vegetables, it was found that although the numbers of viable microorganisms showed considerable reduction, there was no sterility after storage at -16° C. for about two years. Escherichia coli showed the greatest decrease in numbers. Bacillus subtilis showed the greatest resistance to prolonged freezing. The presence of acid had considerable effect on the destruction of bacteria by freezing. High concentrations of sodium chloride led to a rapid decrease in living cells. Alternate freezing and thawing was no more destructive than continuous freezing. The effect of different degrees of cold was slight for experiments at -16° C., -40° C., and -79° C. Cl. botulinum survived freezing at -16° C. for 14 months and also showed no decrease at -79° C. for two months. Preliminary experiments on the colon-typhoid group are reported.

B. H. W.

(3156) Tarr, H. L. A. and Sunderland, P. A., "Drip in Frozen and Unfrozen Fillets Controlled by Brining." Progr. Repts. Fisheries Res. Bd., Canada 45, 19-20 (1940). - Immersion for 1 minute in 15% brine will prevent drip in fillets from most varieties of fish without causing an absorption of greater than 1-1.5% of salt, especially in cases where the fillets are not skinned. The brine should be made from a high-grade commercial salt, as impure salt causes a "salt fish" flavour after a few months storage.

Br. A. BIII, 73 (March, 1941).

(3157) Tarr. H. L. A., "Effect of pH on Swelling and Drip in Fish Muscle." J. Fisheries Res. Bd. Can. 5, 411-27 (1942).

(3158) Tarr. H. L. A.. "Control of Rancidity in Stored Fish." Progr. Rept. Fisheries Res. Bd. Canada, Pacific Sta. 64, 57-61 (1945). - Several compounds, including ascorbic acid (I), cysteine (II), $CS(NH_2)_2$ (III), lauryl thiodipropionate (IV), gallic acid (partly neutralized as Na salt) (V), Et (VI), and Pr gallate (VII), which showed promise of being used in practice, have been tested for their antioxidant activity in fish flesh. This activity was tested either by dipping fillet pieces into a solution of the antioxidant (0.25 or 0.5% usually) for 1 minute at room temperature, wrapping them in cellophane after dipping, and storing at the desired temperature, or by adding the desired amount of antioxidant in 1% aqueous solution to

the minced fillet, and, after mixing well, storing 1-oz. portions in 6-oz. screw-cap jars. With white spring salmon fillets, immersed in aqueous solutions of NaCl (20%), $NaNO_2$ (0.5%), (V), and (VI) (0.5%) (the last three also in combination with NaCl), and stored at 32° F., bacterial growth and attendant spoilage was retarded up to 7 days (up to 15 days with $NaNO_2$). During these periods (V) and (VI) inhibited peroxidation in all fillets, even in those dipped in NaCl (a known accelerator of rancidity). With pink salmon fillets, dipping in 0.5% (VI) and (VII) (average amount of gallate in flesh after dipping being approximately 0.014%) and storing at 14° F. for 97 days considerably delayed the onset of rancidity. Experiments with minced flesh of herring and red spring salmon, incorporated with (I), (II), (III), (IV), (VI), and (VII) in 0.05% concentration and stored for approximately 150-170 days at -4° F. showed that whilst (I), (VI), and (VII) considerably retarded rancidity, (II) gave only slight protection, and (III) and (IV) gave no protection or actually accelerated fat oxidation. Tests with minced red spring and coho salmon containing 0.02% of (VI) and (VII) and stored, the former at 14° F., -4° F., and -18° F. for 120 days, the latter at 14° F. and -4° F. for 109 days, showed that peroxidation was considerably delayed at all temperatures but more so at the lower ones. As with the unfrozen fish fillets, the effect of NaCl (1%) in stimulating fat oxidation was greatly retarded in frozen minced red spring and chum salmon flesh containing 0.02% of (VI). In general, (V) is not nearly so potent an antioxidant as (VI), presumably due to the latter being more soluble in the fat. In appearance, fish treated with gallate retain their red colour, even after prolonged storage at unfavourable temperatures, whilst the control fish become bleached, have a yellowish appearance, and develop ranoid odours.

Br. A. BIII, 114 (May, 1946).

(3159) Tarr, H. L. A., "Control of Rancidity in Stored Fish. II." Progr. Rept. Fish Res. Bd. Canada, Pacific Sta. 66, 17-20 (1946). - Split fresh herring and fillets of lemon sole and of red spring, coho, and pink salmon, the last 3 species being defrosted after previous storage for 4 months at -20° to -25° F., were wrapped individually in moisture-proof, self-sealing, transparent cellophane, half of the fillets from each fish being brined beforehand (1 minute in 35% saturated brine at 35-40° F., drained for 5 minutes). Both brined and unbrined fillets packed into four 5-lb. waxed containers, frozen, and kept overnight at -25° F. were stored at 14° F. as follows: A in air (control); B in an airtight aluminum pressure cooker, air removed under vacuum, and CO_2 run in to give a final pressure of 2 lb. per sq. in.; C as B but using N_2; D as B but air not removed, CO_2 flushed through for 30 minutes at 2 lb. per sq. in., and the container sealed. After 40 days' storage, one fillet, brined and unbrined, was removed from each lot and a portion used to determine the peroxide value, the remainder being tasted after boiling. Results show that whilst the air-stored fillets gave peroxide values considerably greater than the initial ones, those stored under treatments B and C gave values approximately the same as the originals. With D there was also a noticeable increase in peroxides, but not so high as in A. In taste, samples from A were definitely rancid, from C were very good, whilst B and D had "off" flavours, D being rancid as well.

Br. A. BIII, 177 (Aug., 1946).

(3160) Tarr, H. L. A., "Control of Rancidity in Stored Fish. III." Progr. Rept. Fisheries Res. Bd. Canada, Pacific Sta. 68, n. p. (Sept., 1946). - Dealing with the value of ice "glazes" and of immersion in ascorbic acid solutions in retarding the development of rancidity in frozen fish, this report relates to a series of experiments on that subject. Other reports have dealt with different cold storage temperatures and of storage in N_2 or CO_2 gas. Unglazed, glazed, and dipped salmon steaks and fillets were indi-

vidually wrapped and stored at temperatures below freezing, and subsequently tested for their peroxide value after different periods of time. Experiments showed that both glazing and dipping methods of treatment can be successfully applied when using ascorbic acid or sodium ascorbate as an antioxidant. On the other hand, glazes of ethyl gallate were practically no better than ordinary water glazes in preventing development of rancidity, although ethyl gallate dips were quite effective. Tests indicated that 0.04 per cent or more of ascorbic acid must be present in fish flesh to retard fat oxidation, and that at the present price of ascorbic acid the cost of dipping treatment might be about 3/4¢ per pound of fish.
F. I. 19, 420, 422 (1947).

(3161) Tarrant, L. Freezing Vegetables and Fruits for Home Use. Pa. State Col. Agr. Ext. Circ. No. 252, Rev., 1945. 20 pages.

(3162) Thiessen, Emma J., "Vegetables for High Altitude Freezing." West. Canner & Packer 39, No. 7, 64-5, 69 (1947). - The University of Wyoming Experiment Station is carrying out tests to determine the varieties of vegetables which grow well at high altitudes and yield good quality frozen products. Climatic conditions (especially the frost-free time range) must be given primary consideration, although high altitudes in general yield crops superior in flavor and texture, snap beans, broccoli, cauliflower, peas, and leafy vegetables having been grown with great success. Standard procedures were used in the blanching and freezing of all varieties in order to determine the quality of appearance, flavor, and texture as compared with commercially frozen samples. Sharp-freezing at -20° F. and subsequent storage at 0° F. gave products which ranked in palatability tests in the following order: peas, broccoli, corn, spinach, carrots, wax and green snap beans, cauliflower, kale, mustard, and chard. The varieties found best for freezing were not always the best yielding varieties at high altitudes.
B. J. A.

(3163) Thomas, W. P., "Past, Present, and Future of Frozen Foods." Canning Trade 68, No. 31, 62-63, 66 (1946); Frozen Food Indus. 2, No. 3, 16-7, 41-3 (1946).

(3164) Thomas, W. P., "The Distributor and His Responsibilities." Frozen Food Indus. 2, No. 2, 19, 44-5 (1946). - In the frozen food industry.

(3165) Thompson, H. H., Cecil, S. R., and Woodroof, J. G., "Stored Frozen Stock Produces Better Preserves." Food Indust. 18, No. 9, 1341-43, 1510 (1946). - Preserves made from frozen stock have better flavor and color than when made from fresh stock and stored at room temperature. Use of frozen stock allows year round operation. Sulfite treatment impairs quality.
B. A. 21, 817 (1947).

(3166) Thomsen, F. L., "Developments in Pre-packaged, Frozen Food Open 'Revolutionary' Market." Air Conditioning and Refrig. News 47, No. 10, 18-9 (1946).

(3167) Thomsen. F. L., "Frozen Milk." Hoard's Dairyman 91, 257 (1946).

(3168) Thomsen, F. L, "New Ideas in Dairy Products; Government Man Discusses Dry Milks and Frozen Milks." Paoific Dairy Rev. 50, No. 6, 16 (1946).

(3169) Tolk, B., "Foil, Metal-end Containers for Frozen Items as Food Industry Tests New Packaging." Ptr. Ink 216, 110 (Sept. 27, 1946). - New techniques in frozen foods packaging include metal-end containers, aluminum foil container, and overwrapping. The metal-end container makes it possible to fill and seal frozen food containers at high speeds. Aluminum foil reduces freezing time from 30 to 50%. The Reyseal overwrap consists of a multiple lamination of foil, paper, wax, and tissue.

M. P.

(3170) Tolk, B., "Produce Marketers Survey Pre-Packaging to Stem Competition from Frozen Foods." Ptr. Ink 218, 70 (June 3, 1947). - By pre-packaging fresh produce with weight and price marked on each package, fresh produce marketers hope to compete more successfully with the frozen foods distributors, and at least two corporations look forward to expanding their paper and transparent film outlets in the pre-packaging industry.

M. P.

(3171) Torudd, E., "Food Freezing Progress in Scandinavia." Food Freezing 2, 342-44 (1947). - A review of the frozen food industry in Sweden, Norway, and Denmark.

R. A. 2, 200 (1947).

(3172) Tracy, P. H., "Principles of Ice-cream Making. I-V." Ice Cream Tr. J. 42, Nos. 7, 8, 9, 10, 12 (1946). - A review of the basic methods of making ice cream which includes a discussion of freezers and other refrigeration equipment.

R. A. 2, 104 (1947).

(3173) Tracy, P. H., Sheuring, J. J., and Dorsey, M. J., "Comparison of Sucrose, High Conversion Corn Sirup, and Dextrose in the Preservation of Peaches by the Frozen-pack Method for Use in Ice Cream." J. Dairy Sci. 30, 129-36 (1947). - Sucrose, high conversion corn sirup, and dextrose were added to sliced peaches in 12 combinations with fruit-to-sugar ratios of 1:1, 2:1, 2.5:1, 3:1, and 4:1. Eight different varieties of peaches were used. The samples, packed in pint paper containers, were precooled for 2 hr. in a 40° F. room and then stored in a -2 to -20° F. room for 4-8 months. Of the packs prepared with a single type of sweetening agent, the sucrose samples had the best color; corn sirup, second best; and dextrose, poorest. Samples having the best flavor contained 50% sucrose and 50% cor sirup in a 2:1 pack. Dextrose recrystallized when used in this proport on but could be used in 3:1 or 4:1 packs if combined with 50% of either sucrose or corn sirup. In all cases most color and flavor were retained with the use of higher proportions of sugar. There was no advantage in mixing the sugars before adding to the fruit, nor was there any advantage in mixing the sugar and fruit before packing, provided the containers were turned later.

R. A. 2, 180 (1947).

(3174) Tracy, T. B., "Conversion of Used Milk Coolers To Home Freezers." Agr. Engin. 28, No. 3, 113-15 (1947). - A milk cooler may be successfully adapted as a 0° F. freezer by increasing the amount of insulation and speed-

ing up the condensing unit to provide the necessary refrigeration. The cabinet should have a minimum of 6 in. of insulation in the sides and bottom and 3-4 in. in the lid. The compressor speed should be increased about 15%. A thermostatic expansion valve should be used in preference to an automatic valve.

R. A. 2, 162 (1947).

(3175) Trelease, R. D. and Koonz, C. H., "Quality of Eviscerated Poultry from Defrosted, Dressed Stock." Food Res. 10, 373-78 (1945). - Warm evisceration of poultry prevents tainting of the edible tissues with visceral flavours. The quality is seriously impaired when defrosted, dressed poultry is held at 10° C. for 1 day or more and, to a smaller degree, at 2.2° C. Poultry intended for freezing and subsequent evisceration should be chilled rapidly, and eviscerated at once after defrosting.

Br. A. BIII, 51 (March, 1941).

(3176) Tressler, D. K., "Success with Freezing Fruits and Vegetables." Am. Cookery 50, No. 10, 16-9 (1945).

(3177) Tressler, D. K., "Freezing Spring Fruits and Vegetables." Am. Home 33, No. 6, 88-90 (1945).

(3178) Tressler, D. K., "Freeze Fruit with Little or No Sugar." Ice Cream Field 46, No. 1, 14, 20 (1945).

(3179) Tressler, D. K., "Merchandising Frozen Cooked Foods." Ice Cream Field 46, No. 4, 68, 76 (1945). - While a large variety of cooked foods and baked goods have been frozen, caution is suggested in assuming that all cooked foods can be satisfactorily preserved by freezing. Preliminary study of new items is suggested in order to determine (1) compatibility and stability of ingredients under freezing, (2) behavior in prolonged storage, especially occurrence of rancidity in fats, and (3) control of bacteriological developments in specific cooked foods during preparation and freezing by provisions for sanitation and quick cooling.

R. A. 1, 91 (1946).

(3180) Tressler, D. K., "Nutritive Value of Frozen Foods." J. Am. Dietetic Assn. 21, 273-76 (1945); Frozen Food Industry 2, No. 12, 24-5, 40-2 (1946). - This survey of the literature of the last decade indicates that little carotene is lost during freezing procedures, and that most vegetables do not lose carotene during freezer storage. The water-soluble vitamins, thiamin and ascorbic acid, on the other hand, may be lost during blanching and other procedures incidental to freezing: thiamin up to 25% and ascorbic acid from 20 to 40%. The loss in the vitamins during storage at 0° F. is negligible. However, storage temperature much above 0° F. results in considerable loss of ascorbic acid; a small loss of riboflavin probably occurs. During cooking, little, if any, of the vitamins are destroyed, but considerable amounts of the water-soluble vitamins may be dissolved in the cooking water.

R. A. 1, 29 (1946)

(3181) Tressler, D. K., "Freezing Meat." Locker Operator 6, No. 9, 16 (1945). - Freezing meat is the cornerstone of the locker plant business, and

can be done either in the home freezer or in the freezer locker. The quality should be improved by quick chilling, proper aging, wrapping in moisture-proof packages, and storing at 0° F. or lower.

R. A. 1, 38 (1946).

(3182) Tressler, D. K., "Tricks and Tips for Freezing." Amer. Home 35, No. 6, 108-11 (1946). - This illustrated article describes the preparation of foods for freezing and the type of syrup to be used. Also it offers suggestions for protecting the color of fruits and vegetables.

M. B.

(3183) Tressler, D. K., "Freezing Nova Scotia Fruits." Can. Refrig. J. 12, No. 12, 11-3 (1946). - Canadian-grown blueberries, raspberries, plums, cranberries, and apples are well suited to freezing preservation. Methods of preparing, packaging, freezing, and storing these products are discussed.

R. A. 2, 96 (1947).

(3184) Tressler, D. K., "New Developments in Freezing Garden Produce." Flower Grower 33, 317, 338-39 (1946). - New varieties of vegetables and fruits perfected for freezing are the Logan variety of snap bean, the Fordhook U. S. No. 242 lima bean, the Wando pea, the Greater Progress pea, Lincoln and Carmelcross sweet corn, tampala, purple headed cauliflower, and celeriac; Seedling No. 1765 of Dr. G. F. Waldo's strawberries, the Willamette raspberry, and the Cascade dewberry. New techniques in freezing involve the use of ascorbic acid, a special corn syrup called Sweetose, new types of containers, and better methods of thawing and cooking frozen foods.

M. B.

(3185) Tressler, D. K., "Ideal Storage Temperatures for Frosted Foods." Frosted Food Field 2, No. 4, 1, 7 (1946); Ice Cream Field 47, No. 4, 74-5 (1946). - In general, the lower the temperature of storage, the longer a given frozen food can be held without noticeable change of flavor, color, and vitamin content. Some products are more stable at a given temperature than others. Fatty fish, poultry, peaches, apricots, asparagus, corn, snap beans, lobster, and shrimp require lower temperature for storage periods of a year than beef, apple sauce, squash puree, or berries. Tabular data are given showing the storage life of common frozen foods at 10, 0, and -10° F.

R. A. 1, 154 (1946).

(3186) Tressler, D. K., "Preparing and Cooking Frosted Foods." Frosted Food Field 2, No. 5, 12 (1946). - Directions are given for thawing and cooking frozen foods, especially meats.

M. B.

(3187) Tressler, D. K. and DuBois, C. W., "Preventing Discoloration of Frozen Foods." Frosted Food Field 3, No. 2, 23 (1946). - The use of ascorbic acid as an anti-browning agent for peaches and similar fruits has developed rapidly in the past two years. It is now considered standard practice to add about 0.045% ascorbic acid, either in sirup or with dry sugar, which acts as a reducing agent and is stabilized by 0.5% citric acid. The use of sulfur dioxide or blanching of these fruits to prevent browning is not looked upon with favor.

R. A. 1, 213 (1946).

(3188) Tressler, D. K., "Frosted Food Standards and Quality Control." Frosted Food Field 3, No. 3, 1, 16-7 (1946). - Lack of knowledge of correct procedure on the part of the frozen food packer, lack of quality control, and careless or improper handling and storage of the frozen packaged products are the reasons for the poor quality and lack of uniformity in some frozen foods now being sold. Standards and quality control must be maintained at a high level if the public is to continue buying frozen products.

M. B.

(3189) Tressler, D. K., "Proper Temperatures for Farm and Home Freezers." Frosted Food Field 3, No. 5, 1, 14 (1946). - Foodstuffs should be frozen and stored at 0° F. in farm and home units.

R. A. 2, 111 (1947).

(3190) Tressler, D. K., "Some Solutions to Fruit Freezing Problems." Frozen Food Indus. 2, No. 9, 14, 38 (1946). - Frozen fruit packs have more than doubled in recent years, due to the increase in quantity of apples, peaches, and apricots frozen. Blanching must be carefully done to avoid making the fruit mushy. Since these fruits all brown easily, SO_2 or a sulfite or a bisulfite may be used successfully to prevent this. Sugar or sugar syrup may also be used as anti-oxidants. Converted corn syrups have been proved better in some cases than those of cane or beet sugars. Also, a small amount of ascorbic acid added to the syrup will prevent browning. Thawing may cause the almost complete collapse of the frozen fruit if a syrup is not used, and rapid freezing will reduce the drip which occurs when fruit is thawed. Electronic thawing may be the answer to these difficulties.

B. J. A.

(3191) Tressler, D. K., "Recent Advances in Frozen Food Technology." Fruit Prod. J. 25, 227-28, 251 (1946); Locker Operator 7, No. 10, 38, 40, 60-1 (1946); West. Frozen Foods 7, No. 6, 6, 8-9 (1946). - A historical review of the frozen food industry, general in scope. Flavor losses in frozen foods, adaptability of preoooked foods to freezing, and some difficulties encountered in freezing foods are discussed.

B. J. A.

(3192) Tressler, D. K., "Frozen Fruit Purees in Ice Cream." Ice Cream Field 47, No. 1, 32, 60-1 (1946). - Frozen fruit purees are used for ices, sherbets, soda fountain sirup, soft drinks, puddings, ribbon ice cream, ice cream topping sauces, pie and pastry fillings, and frozen desserts. Crushed and pureed fruits hold their flavor and color better than fruits which have not been crushed prior to freezing. Some of the fruits that are best when crushed or sliced and then frozen are strawberries, peaches, and nectarines. In certain berries where the seeds are objectionable, the puree form is preferred to the crushed fruit. The addition of sugar helps to hold the flavor and color and also retards oxidation. The addition of a protective colloid such as pectin or gelatin is necessary for some purposes such as in frozen desserts and ribbon ice cream. Formulas for pectinized puree for peaches, nectarines, and apricots are given in detail. A tested recipe for raspberry, boysenberry, loganberry, youngberry, blackberry, and blueberry pectinized purees is also presented. A formula is given for a frozen dessert called Velva fruit.

R. A. 1, 86-87 (1946).

(3193) Tressler, D. K., "Freezing Autumn Fruits." Locker Operator 8, No. 1, 20, 71-2 (1946); New England Homestead 119, No. 15, 23 (1946). - Procedures are given for using enzyme-converted corn sirup in the preparation and freezing of apples, applesauce, muskmelons, peaches, pears, and plums by locker plant patrons.

R. A. 2, 26-7 (1947).

(3194) Tressler, D. K., "Preparation and Freezing of Fruits and Vegetables." Proc. Nat. Frozen Food Lkr. Assn., 84-9 (1946). - Locker plants which offer fruit and vegetable prooessing services should have a steam blanoher, pea and lima bean sheller, steam jacketed kettle, heavily tinned wire basket, strawberry slicer, cherry pitter, bean snipper, bean cutter, bean frencher, corn husker, corn cutter, apple parer and corer, peach slicer, and asparagus cutter. Instructions are given for preparing fruits and vegetables for freezing.

R. A. 2, 106 (1947).

(3195) Tressler, D. K., Evers, C. F., and Long, L., Into the Freezer--and Out. New York: Avi Pub. Co.. 1946. 223 pages.

(3196) Tressler, D. K., "Discussion on Freezing Pies." Bakers Weekly 134, No. 2, 47-48 (1947).

(3197) Tressler, D. K., "Industry Needs Improved Vegetable Cooling Methods." Frosted Food Field 4, No. 1, 20-1 (1947). - Blanched vegetables which are to be frozen must be oooled immediately to 60° F. or below to prevent undesirable chemical and microbiological changes. The use of a cold water spray or bath causes considerable loss of flavor and nutritive values. The use of an air blast cooler, if properly designed to prevent desiccation of the vegetables, is a more satisfactory means.

R. A. 2, 94 (1947).

(3198) Tressler, D. K., "Will the Home Freezer Hurt the Packer? Locker Operators now Realize Freezing Cabinets Aid Business." Frosted Food Field 4, No. 2, 4-5 (1947).

(3199) Tressler, D. K., "Fast Cooling of Cooked Foods Neoessary Before Freezing." Frosted Food Field 4, No. 3, 30-1 (1947). - Rapid oooling of cooked foods is essential to prevent (1) loss of flavor, (2) overoooking, and (3) tremendous bacterial growth as the food passes through the temperature range of 120-180° F. Packaging oooked food before cooling aids in production of sterile products but eliminates the possibility of using most of the types of packages now available to the industry.

R. A. 2, 191 (1947).

(3200) Tressler, D. K., "Preparing and Freezing Fruits and Vegetables in the Locker Plant." West. Frozen Foods 8, No. 5, 3-4, 12-13 (1947).

(3201) Tressler, D. K. and Evers, C. F., The Freezing Preservation of Foods. Second Edition. New York: Avi Pub. Co., 1947. 932 pages.

(3202) Trevino, B. C., "A New Method for Packing Frozen Foods in Cardboard Cartons." Mex. Div. Gen. del Com. Ext. y del Serv. Cons. Rev. del Com. Ext. 11, No. 11, 16-19 (1946).

(3203) Trout, G. M., "The Freezing and Thawing of Milk Homogenized at Various Pressures." J. Dairy Sci. 24, No. 4, 277-87 (1941).

(3204) Trout, C. M., Moore, L. A., and Scheid, M. V., "Influence of Several Factors upon the Amount and Stability of Carotenoids in Frozen Cream and Its Relationship to the Metal-induced Oxidized Flavor." J. Dairy Sci. 26, No. 6, 495-504 (1943). - Seasonal variation in the carotenoid content of milk was assayed. Pasteurization, homogenization, addition of sucrose, addition of 1 p.p.m. copper, type of container, freezing, and storage for 12 months at 0 to -10° F. had no appreciable effect on the carotenoid content of high-fat cream. There was no correlation between induced oxidized flavor and carotenoid content.

R. J. A.

(3205) Trout, G. M. and Scheid, M. V., "Influence of Several Factors on Flavor of Frozen Sweet Cream." J. Dairy Sci. 26, 609-18 (1943). - The following factors influence the storage of frozen cream: temperature of pasteurization (185° F. for 5 minutes was superior to lower temperatures in preventing oxidized flavour); copper contamination is important in this respect; homogenization and addition of sucrose are slightly beneficial, but do not prevent the flavor developing; high initial titratable acidity and variation in carotenoid content had little influence.

Br. A. BIII, 63 (Mar., 1945).

(3206) Trout, G. M. and Scheid, M. V., "The Stability of the Fat Emulsions of Frozen Cream." J. Dairy Sci. 26, No. 7, 619-24 (1943). - High-testing frozen cream was observed in order to determine the amount of "oiling off" which took place, and it was seen that fast freezing did not prevent this ill effect. Frozen cream, pasteurized for 15 minutes at 165° F. showed less, and the addition of sucrose also retarded it. Maximum destabilizing effect of freezing and storage on both homogenized and non-homogenized cream occurred during first 3 months of storage.

B. J. A.

(3207) Trout, G. M., "Freezing Cream for the Ice Cream Manufacturer." Food Freezing 2, 203-5, 226 (1947). - Two major defects associated with frozen cream are (1) oiling off upon defrosting and (2) oxidized flavor. Oiling off has been overcome by the addition of 10-12% sucrose to the cream prior to freezing. If oiling off occurs, keeping the mix well agitated subsequent to homogenization ensures uniform fat distribution. Oxidized flavor may be prevented by (1) storing only freshly separated cream, (2) keeping the milk and/or cream out of contact with copper and (3) heating and holding the cream sufficiently hign and long to produce a cooked flavor (as long as cooked flavor is present oxidation does not occur). A low-acid, pasteurized cream testing 50% fat packed in nonabsorbent, impregnated paper containers will retain its quality if properly frozen and stored at -10° F. The maximum storage period should be determined by taste testing the cream at regular intervals. As soon as the quality begins to decrease, the cream should be used at once. Over 58,000,000 lb. of frozen cream were stored in the U.S. in 1945.

R. A. 2, 188 (1947).

(3208) Trusoott, J. H. L., "The Maintenance of Food Quality by Low Temperatures." Can. J. Public Health 38, 96 (1947). - Temperature should be controlled more closely than is now usual in oommercial practioe for the best storage of raw, living fruit and vegetable tissue. Closer control of temperature should do much to eliminate a large part of an estimated present loss of 50% of harvested vegetables. It would also allow higher relative humidities in storage, which should benefit most fruits and vegetables. Modern methods of handling frozen fruits and vegetables quickly kill the tissues and inhibit microorganisms thus eliminating all biological activity. However, detrimental chemical changes will proceed if the enzymes are not inactivated by heating before freezing. Freezing unduly softens some plant tissues and changes the flavor and odor characteristics of others. The greatest need in the freezing preservation of fruits and vegetables is the breeding of varieties more suited to this method of preservation.

R. A. 2, 192 (1947).

(3209) Tufts, W. P., "Selecting, Harvesting, and Handling Fruits for Freezing." Frozen Food Tech. Conf., 1-4 (1946). - A review of the varieties of apples, apricots, peaches, nectarines, plums, figs, strawberries, raspberries, etc., now being grown for freezing in California.

B. J. A.

(3210) Turner, H., "Establishing and Operating Freezer Locker Plants. I-II." Frozen Food Ind. 2, No. 6, 8-11; No. 7, 16-18 (1946); Also in Univ. of Georgia Bulletin 45, No. 23, 1945. 27 pages. - Information is given on the initial and operating costs of 3 types of locker plants in Georgia, and the costs of the services rendered by them. Operation oosts and profits, the sources of capital for financing plants, the procedures in designing, organizing and operating, supplies required, and rules and regulations for the patrons are discussed.

R. A. 2, 15 (1947).

(3211) Underhill, R., "Acres of Jam; Berries Are Packed and Frozen in Arkansas for Future Distribution to Preservers, Ice Cream Manufacturers, and Institutional Buyers." South. Food Processing 1, No. 5, 7, 28, 33-4 (1946).

(3212) Urbain, O. M. and Miller, J. N., "Relative Merits of Sucrose, Dextrose, and Levulose as Used in the Preservation of Eggs by Freezing." Indus. & Eng. Chem. 22, 355-6 (1930). - Tests proved that egg white suffers no breakdown as the result of freezing, but the yolk is altered due to the separation and coagulation of the lecithin. The addition of 10 per cent by weight of dextrose or levulose will prevent this latter effect. Likewise, these sugar solutions eliminate the watery and ropy condition of thawed yolks. Dextrose and levulose solutions were found to be much more effective as a whole than sucrose.

B. J. A.

(3213) Van Blaricom, L. O. and Morgan, C. L. Freezing Preservation of Food Products. S. C. Exp. Sta. Circular No. 71, 1945. 14 pages.- Recommendations for the preparation, freezing, and storage of vegetables, fruits, poultry, and eggs are given. R. A. 1, 214 (1946).

(3214) Van Blaricom, L. O., "Peach Processing in the Southeast." Natl. Peach Council, Peach Ann., 25-27 (1947). - Canning and freezing.

(3215) Van Duyne, F. O., Chase, J. T., Retzer, J. L., and Simpson, J. I., "Retention of Ascorbic Acid in Vegetables Preserved by Quick Freezing." Proc. Inst. Food Tech., 13-20 (1945); Food Packer 26, 73 (1945); Also in Frozen Food Industry 2, No. 6, 14-6, 40 (1946). - The purpose was to determine how the ascorbic acid content of peas, snap beans, soybeans, and spinach was affected by preparation for quick freezing, by quick freezing, storage, and subsequent cooking. Dark Podded Thomas Laxton peas, Stringless Black Valentine snap beans, Funk Delicious soybeans, and Bloomsdale Savoy spinach contained 0.22, 0.20, 0.35, and 0.63 mg. of ascorbic acid per g. of raw vegetable. The peas retained 85% of the original amount of ascorbic acid after blanching, 78% after blanching and cooling, 78% after quick freezing, and 79, 70, 59, and 53%, respectively, after 1, 2, 6,and 9 months storage at -17.8° C. The snap beans. cut lengthwise, retained 57, 56, and 50% after blanching, blanching and cooling, and after quick freezing. After 9 months' storage the ascorbic acid content was reduced to 23% of the original amount. The soybeans lost 8% ascorbic acid during blanching, cooling, and quick freezing. An additional 10% was lost during 9 months' storage. The spinach retained 54% after blanching and cooling and 46% after quick freezing. The retentions at 1, 3, 6, and 9 months' storage were 43, 36, 30, and 20%. When the stored vegetables were cooked in a small amount of water for short periods of time, the additional amounts of ascorbic acid lost ranged from 5 to 21% of the original amounts.

C. A. 40, 6708 (1946).

(3216) Van Duyne, F. O. How to Prepare Fruits and Vegetables for Freezing, with Suggestions for Choosing Suitable Varieties. Ill. Agr. Col. Ext. Circ. No. 602, 1946. 16 pages.

(3217) Vaughn, R. H., Stadtman, T. C., and Kueneman, R. W., "Control of Mioroorganisms in Frozen Food Plants." Quick Frozen Foods 9, No. 2, 76-8, 114 (1946). - Control of microbial quality in frozen foods is largely a plant sanitation problem. Since sound, fresh produce has a majority of contamination on its surfaces, adequate washing with clean, fresh water reduces bacterial populations. Blanching may reduce populations as much as 99.9%, but careless post-blanching handling may cause recontamination. Cooling waters should be potable supplies and should not be recirculated. Increase of bacterial populations may be avoided by (1) speed-up of preparation lines, (2) precooling before packaging, (3) holding in cooler storage prior to freezing, (4) in-plant freezing to avoid holding or transporting blanched packaged foods, (5) continuous sanitizing of equipment, and (6) use of equipment designed for easy cleaning and sanitizing.

R. A. 2, 7-8 (1947).

(3218) Vaughn, R. H. and Stadtman, T. C., "Sanitation in the Processing Plant and its Relation to the Microbial Quality of the Finished Products." Food Freezing 1, 334-36, 364 (1946). - Continuous control of frozen food processing plant sanitation stressed primarily from the standpoint of freezing preservation of vegetables, since they are more readily attacked by many types of bacteria than is the case with fruits. Post-blanching recontamination is shown to be one of the chief factors involved in production of vegetables having high or excessive microbial populations at time of freezing, indicating that post-blancher equipment should be operated so that a minimum of recontamination occurs. Continuous sanitary control of processing equipment, accomplished by in-plant chlorination of water used to sanitize equipment, by the use of sulfite solutions, or by a number of surface-active agents, largely prevents recontamination of blanched vegetables.

A. S. C.

(3219) Venemann, H. G., "Tailor-made Home Freezing Units--a Field for Returned Veterans?" Food Freezing 1, 304-05, 317 (1946).

(3220) Venemann, H. G., "Locker Plant Engineering." Quick Frozen Foods 9, No. 10, 129, 151-52 (1947).

(3221) Volkert, D. G., "Frozen Meals Afloat." Frozen Food Ind. 3, No. 2, 16, 41-2 (1947). - A new market for industrial use of frozen foods has been opened up by the demand for pre-cooked meals in dining halls of ships. Up to 55¢ per meal is being saved by the 10 lines now using them, and they are well liked by the crews.

B. J. A.

(3222) Voss, W. W., "What to Keep in Mind in Designing Food Freezer." Elec. Mfg. 36, No. 2, 104-07, 176-86 (1945). - Consideration of air spillage as factor in determining whether product will be top-opening chest or side-opening cabinet type; utility and convenience of maintenance influence designs.

E. I. 1945, 921.

(3223) Wager, H. G., "Changes in Weight of Vegetables During Scalding. I-II." Food Manuf. 21, 187-190, 209, 254-6 (1946). - The change in weight and loss of soluble solids of carrots, swede, cabbage, and potatoes during H_2O- and steam-scalding have been investigated. After scalding in H_2O, the moisture content of the vegetables and the loss of soluble material are largely independent of the state of H_2O balance of the raw vegetables. After scalding by steam, the H_2O content of the vegetables is almost independent of the initial H_2O balance, except that wilted vegetables may not attain the weight of unwilted scalded material or the condensate available for absorption is small. The loss of soluble material in steam scalding is equivalent to the loss of liquid by drip; i.e., wilted vegetables lose little and fully turgid much solid matter. The scalding of partly wilted vegetables as a means of reducing leaching losses is suggested.

Br. A. BIII, 35 (Feb., 1947).

(3224) Wagoner, C. E., Vail, G. E., and Conrad, R. M., "The Effect of Degree of Surface Exposure on Deterioration of Frozen Poultry." Poultry Sci. 26, 173-75 (1947). - New York dressed, eviscerated, and cut up poultry was wrapped in cellophane, packed in poultry boxes with waxed paper liners, and frozen and held at -13° C. (8.6° F.). Birds were removed from storage at intervals between 9 and 20 months and the skin and internal fat examined for storage stability as measured by acid, aldehyde, and peroxide content. The increased amount of surface exposed to the air by evisceration increased the rate of development of rancidity but not to a serious extent if the poultry was stored for a reasonable length of time. The reduction in exposed surface which resulted when the poultry was cut up improved the storage stability appreciably.

R. A. 2, 185 (1947).

(3225) Wagoner, C. E., Vail, G. E., and Conrad, R. M., "Studies on the Stability of Poultry Fat under Frozen Storage. I. The Effect of Premortal Fast on Deterioration of Frozen Poultry." Poultry Sci. 26, 167-69 (1947). - A group of roasters was starved for 16 hours before slaughter and a similar group was full-fed until the time of killing. After dressing and chilling, part of the birds from each group were eviscerated and frozen at -13° C. (8.6° F.) and the remainder were New York dressed and frozen at the same temperature. The birds were examined at intervals during 9-20 months' storage at -13° C. (8.6° F.) for oleic acid, aldehyde, and peroxide content of the uncooked internal skin fat, and for aroma after cooking in a covered dish. It was found that starving poultry for 16 hours before slaughter tended to increase the storage stability slightly. No difference was found in the extent of fat oxidation. The starved birds were found to contain fat of greater acidity.

R. A. 2, 184-5 (1947).

(3226) Wagoner, C. E., Vail, G. E., and Conrad, R. M., "Studies on the Stability of Poultry Fat under Frozen Storage. II. The Influence of Preliminary Holding Conditions on Deterioration of Frozen Poultry." Poultry Sci. 26, 170-72 (1947). - Freshly slaughtered fryers were eviscerated at once; held 24 hours in chill room at 3-5° C. (37-41° F.) before evisceration; held in chill room 6 days before evisceration; and frozen, defrosted, and then eviscerated. All 4 groups were then wrapped in cellophane, packed in

poultry boxes lined with waxed paper, and frozen and held at -13° C. (8.6° F.). They were examined for fat stability immediately after freezing and after periods of 9-20 months' storage. Holding dressed poultry at chill room temperature for 1 day or longer before evisceration and freezing reduced the stability of the fat as measured by acid, aldehyde, and peroxide content, and aroma of the cooked birds. Freezing and thawing before evisceration and subsequent freezing also resulted in increased rancidity.
R. A. 2, 185 (1947).

(3227) Wagoner, C. E., Vail, G. E., and Conrad, R. M., "Studies on the Stability of Poultry Fat under Frozen Storage. III. The Effect of Degree of Surface Exposure on Deterioration of Frozen Poultry." Poultry Sci. 26, 173-75 (1947). - When the exposed surface of poultry in frozen storage is reduced, the stability of its fat is increased.
C. A. 41, 5229 (1947).

(3228) Walker, W. A., "Ascorbic Acid." Frozen Food Ind. 2, No. 3, 8-9, 27 29, 31, 35 (1946). - Methods and rates of applying ascorbic acid for the preservation of color in frozen peaches are given in detail. The addition of ascorbic acid to the sirup at the rate of 225 mg. of ascorbic acid per lb. of packed fruit is the preferred method. The same treatment is also suggested for apples and cherries. Information on fortification of various juices such as apple and tomato is also given.
R. A. 2, 38 (1947).

(3229) Wallace, M. D. and Baumgartner, J. G., "The Destruction of Microorganisms in the Presence of Sugars. II. The Influence of Sugars in Chemical Disinfection." J. Soc. Chem. Indus. 55, 37T-40T (1936). - Concentrated solutions of sucrose or glycerol were found to inhibit germicidal action of ionic germicides on B. coli. The sucrose or glycerol solutions offer no protection when the germicidal action on protein is non-coagulative. Protective action is believed due to intense hydration around protein particles (bacteria) caused by adsorption of hydrated sugar molecules. Since more ions have to be adsorbed to offset hydration, longer time is necessary for effective germicidal action.
M. P.

(3230) Waller, A., "Influence of Prepackaging and Freezing on the Vegetable Industry." Comm. Veg. Growers' Assoc. Proc., 42-50 (1946).

(3231) Walsh, W. M., "Better Distribution of Frozen Foods." Butchers' Advocate 119, No. 15, 27-9 (1946).

(3232) Walsh, W. M., "Co-operation Between Producer and Distributor." Canning Trade 68, No. 31, 60-61 (1946). - In the frozen food industry.

(3233) Warming, A., "Nitrous Oxide as a Refrigerant." Dansk Teknisk Tidsskrift 70, 154-57 (July-Aug., 1946). - Nitrous oxide has the following advantages over CO_2 as a refrigerant: (1) higher critical temperature but the same critical pressure, (2) lower triple point, and (3) nontoxicity. Its disadvantages are flammability and high cost. The physical, chemical, and other properties of N_2O are given in tabular form, as well as a comparison with CO_2 and with a N_2O-CO_2 mixture as refrigerants.
R. A. 2, 171 (1947).

(3234) Warner, K. F., "Problems of Locker Industry; with Cost Data." Refrig. Eng. 50, No. 5, 411-12 (1945). - Author points out that adequate refrigeration is essential in locker plants but that prices must be kept down if farm families are to use freezing as method of preserving home grown foods; locker plant natural supplement to home freezer. Before American Society of Refrigerating Engineers.

E. I. 1946, 231.

(3235) Warner, K. F., "Clean Food from Clean Locker Plants." Food Freezing 2, 200-02 (1947).

(3236) Warrington, S. T., "The Locker Plant, Its Place in the Frozen Food Picture." Locker Operator 7, No. 3, 26 (1945).

(3237) Warrington, S. T. and Wilkins, P. C., Cooperative Frozen-Food Locker Plants; Organization and Operation. U. S. Farm Credit Admin. Coop. Res. and Serv. Div. Circ. C-127, Washington, D. C., 1946. 82 pages.

(3238) Wasmuth, J., "New Trend in Merchandising; Home Delivery of Frozen Foods." U. S. Egg & Poultry Mag. 52, 200-1 (May-June, 1946).

(3239) Watson, G. H., "Dual-Process Quick Freezing Plant Built in South." Food Ind. 15, No. 10, 66-8 (1943).

(3240) Watson, P. D. and Leighton, A., "Some Observations on the Freezing Points of Various Cheeses." J. Dairy Sci. 10, 331-4 (1927).

(3241) Watson, W. E., "Future Trends in Home Refrigerators." Refrig. Eng. 53, No. 4, 296-9 (1947). - A prospectus of the household refrigerator, including the improvement in facilities for storage of frozen foods. Emphasis is made of the importance of newly developed materials in improving design. Problems in maintaining high-humidity in refrigerators are discussed.

M. P.

(3242) Watts, M. and Peng, Da-hwei, "Rancidity Development in Raw vs. Precooked Frozen Pork Sausage." J. Home Econ. 39, No. 2, 88-92 (1947). - Results are reported of the effect of pH, salts, and precooking on the rancidity of frozen pork sausage. Rancidification of raw sausage was increased rapidly by decreasing the pH from 6.5 to 4.8; cooked sausage was not affected by changing its pH. Sodium chloride, sodium nitrate, sodium acetate, magnesium chloride, and potassium nitrate had a marked accelerating effect on rancidification of raw sausage but had no effect on cooked sausage. Rancidification was not traceable to any particular ion, and potassium chloride and magnesium chloride had no effect. Acids and salts apparently affected the activity of a fat peroxidizing enzyme, possibly hemoglobin, as it was always accompanied by a change of the red color to gray. A peroxide number of 10 or above may be taken as a measure of rancidity.

R. A. 2, 100 (1947).

(3243) Webb, B. H. and Hall, S. A., "Some Physical Effects of Freezing upon Milk and Cream." J. Dairy Sci. 18, 275-86 (1935).

(3244) Weiser, R. S. and Osterud, C. M., "Studies on the Death of Bacteria at Low Temperatures. 1. The Influence of the Intensity of the Freezing Temperature, Repeated Fluctuations of Temperature, and the Period of Exposure to Freezing Temperatures on the Mortality of Escherichia Coli." J. Bact. 50, 413-39 (1945). - In these studies on the death of Escherichia coli at low temperatures, the suspending medium used was 1 per cent peptone or a peptone buffer mixture at pH 7.0. The rate of storage death at the higher freezing temperatures is very rapid and is much greator at temperatures above -30° C. than at temperatures of -30° C. and below, since immediate death occurs at a brief stage in the freezing process during which extracellular ice formation is being completed. Repeated fluctuations of temperature of frozen suspensions between -30° C. and -78° C. appear to result in a lower mortality than storage at either temperature, but this protective effect was not noted at temperature ranges above -30° C. nor below -78° C.

Author's Summary

(3245) Weiser, H. H., "Some Fundamental Observations on the Activities of Microorganisms in Frozen Foods." Frozen Food Indus. 2, No. 8, 8-9, 36 (1946). - Freezing temperature does not destroy a appreciable number of spore-forming bacteria (bacilli). The viability of bacteria is determined by: (1) food availability, (2) sufficient moisture, (3) the amount of NaCl present, (4) the concentration of sugar, (5) the type of oxygen present, and (6) the temperature. Cold alone is not sufficient, however, to stop the activity of many enzymes. The storage life may be doubled for each decrease of 18° F., provided product was in good condition to begin with and that it was properly packaged.

B. J. A.

(3246) Welch, A. E., "Electronic Food Conditioning." Quick Frozen Foods 9, No. 11, 70 (1947). - The application of electromagnetic energy to food preparation, using microwaves, has reduced cooking time to a fraction of that required at present. Both fresh and frozen produce have been tested, although precooked frozen foods have not been used yet. In addition, this electronic cooker is 10 to 20 times more efficient in its conversion of electromagnetic energy into heat than any other cooking device on the market.

B. J. A.

(3247) Wells, E. P., "Food Freezing by Immersing in Alcohol." Food Freezing 2, No. 12, 83, 100 (1946). - Fast freezing may improve the quality of some foods, such as asparagus and certain fruits, and at the same time lower the freezing cost. Retail packs sealed in tin, plastic, or fiber containers can be frozen by immersion in alcohol in less than 1 hour as compared with 2-4 hours required by the air blast method. The properties of alcohol which make it a suitable medium for immersion freezing include high heat transfer coefficient, low viscosity at low temperatures, noncorrosiveness to metals, and rapid evaporation from cans at room conditions without leaving a residue. The more costly containers required by this method offer greater protection against oxidation, drippage, loss of moisture, and aromatic vapors. A plant recently established at Modesto, California, freezes 1-lb. cans of fruit in 45 minutes at the rate of 150 cans per minute with -35° F. alcohol.

R. A. 2, 115 (1947).

(3248) Westling, L. L., "Marine Refrigeration and Construction after War." Refrig. Eng. 49, No. 6, 460-9, 522-4 (1945). - Comprehensive survey of post-

war marine refrigeration requirements; author stresses fact that quick frozen foods will be greatly increasod in quantity and variety, and that adequate seagoing plant will be able to oarry this low temperaturo class of food in all of cargo spaces; refrigeration facilities for terminals; types of insulation and machinory needed for postwar trade. Before American Society of Rofrigerating Engineors.

E. I. 1945, 990.

(3249) Westling, L. L., "Zero Storage on Shipboard Will Gain Foreign Markets." Food Freezing 1, 83-5 (1946). - A general discussion of low temperature cargo rooms on shipboard is given. Brine wall coils with an auxiliary fan and duct system provide most effectivoly for the flexibility needed in marine cold storago space. Very few ships built during the war years have cargo rooms that can be held at less than 10° F., but many ships now under construction are being equipped with adequate cold rooms. Freons-12 and -22 are the favored refrigerants for marine work, and several new ships are to have turbine-driven centrifugal compressors.

R. A. 1, 164 (1946).

(3250) Westling, L. L., "New Markets, Frozen Foods aboard the Luxury Liner." Food Freezing 1, 170-172 (1946).

(3251) Westling, L. L., "Marine Transport of Perishables." Refrig. Eng. 52, No. 6, 525-9 (1946). - Frozen foods en route to ship must be protected by insulating blankets and dry ice until refrigerated trucks are improved, and sharp subcooling of these items at their source would be desirable. Closed wooden boxes and tinned cylindrical containers are recommended, as well as water repellent fiberboard cartons. The usual temperature differential on board ship of ± 10° F. will not matter greatly if the foods have been superchilled to -120° F. before loading; this will facilitate block storage without damage.

B. J. A.

(3252) Wheelock, B. E., "A Comparative Study of Frozen, Frosh, and Canned Vegetables." J. Am. Dietetic Assn. 22, No. 12, 1104-10 (1946). - Each of 12 vegetables studied in 4 cafeterias required at least twice the total preparation time in the fresh state as in the frozen or canned state. After cooking, the fresh and frozen vegetables had similar quality scores; the canned rated lower. After holding, the frozen vegetables had the highost total score, with the exception of wax beans and spinach. The cost of labor for preparation of the fresh vegetables brought their total cost close to that of the frozen products.

R. A. 2, 109-10 (1947).

(3253) White, W. H., Grant, G. A., and Gibbons, N. E., "Effect of Method of Thawing Frozen Pork on Bacon Quality. Canadian Wiltshire Bacon. XXVII." Can. J. Research 23 F, 363-72 (1945). - Bacon was thawed at 4.4° C., 12.6° C., and 21° C. in H_2O, curing pickle, 5, 15, and 30% brine, and in air at high and low relative humidity. 12.6° C. was a suitable temperature for thawing, which should take place in a reasonable time. Liquid media and high relative humidity air were more satisfactory than dry air. Time for thawing in air was prolongod by wrapping and by low relative humidity. Maximum weight gain occurred at 12.6° C. in H_2O or 5 or 15% brino.

Br. A. BIII, 115 (May, 1946).

(3254) Whiteman, T. M. and Wright, R. C., "The Effects of Temperature on Losses in Sweet Potatoes (in Storage)." Amer. Soc. Hort. Sci. Proc. 48, 437-42 (1946).

(3255) Whiting, R. D. Home Freezing. Internatl. Harvester Co, Chicago, Ill., 1945. 16 pages.

(3256) Wiant, D., Griswold, R., Barrons, K., and Blakeslee, L. Planning for Frozen Foods. Michigan State College Experiment Sta. C. Bull. No. 198, 1946. 38 pages.

(3257) Wiegand, E. H., "Oxidation and its Control." Quick Frozen Foods 8, No. 9, 81-3, 92 (1946). - A review is given of the methods and agents used in controlling oxidation in frozen peaches and apricots. The use of ascorbic acid, sulfur dioxide, sodium chloride, citric acid, thiourea, heavy sugar sirup, and blanching are discussed.

R. A. 1, 213 (1946).

(3258) Wiegand, E. H., "Research--Food Freezers Need It." Food Packer 28, No. 5, 34,52 (1947).

(3259) Wiegand, E. H., "Technical Research in Frozen Foods." Quick Frozen Foods 9, No. 9, II-V (1947). - Technological research must keep paoe with the rapidly expanding frozen foods production. The scientific approach to growing raw materials, production, wholesale and rctail distribution must be maintained. In the development of new varieties of plants to be used for freezing, several qualities are important: (1) good flavor and texture, (2) characteristic color, (3) resistance to natural enemies, (4) abundance of nutrients, (5) high yield, (6) resistance to bruising, and (7) ability to withstand freezing without damage to cellular structure. Research will also be profitable in the plant processing field in these ways: (1) sanitation, (2) rodent control, (3) washing procedures, (4) sorting the raw product, (5) use of equipment, (6) product transportation, (7) relationship between field and product departments, (8) siruping, and (9) safety measures. Also, research must be done in order to set up adequate packaging standards to fulfill the desires and demands of both consumers and the Food and Drug Administration.

B. J. A.

(3260) Wiesman, C. K. and Ziemba, J. V., "How to Prevent Rancidity in Frozen Pork Sausage." Food Ind. 18, No. 12, 1863-4 (1946). - Pork sausage made with salt in the formula and frozen in -40° F. air blast unit to a 10° F. internal temperature within 2 hours did not hold up in -5° F. storage. The lean meat turned gray within a month, and fat became rancid in 3 or 4 months. Discoloration and rancidity became more pronounced with increased length of storage. By omitting salt, the lean meat remained red for 6 months, and the flavor was bland, sweet, and nonrancid. There was no advantage in packing sausage links in tin cans under vacuum or in inert gases.

R. A. 2, 100 (1947).

(3261) Wiesman, C. K., "Factors Influencing Quality of Frozen Meats." Ice & Refrig. 112, No. 4. 21-4 (1947). - Information presented at the Regional

Training Conferences conducted by the Refrigeration Research Foundation to assist the attendants to provide the best possible storage and handling for the products (frozen meats) in their care. The factors which influence the quality life of frozen meats are discussed: type of meat; initial quality of meat; handling prior to freezing; packaging methods and materials; method of freezing; storage conditions. The freezing time of meats is defined as the time which elapses when meat is brought from 32° F. to 25° F. The advantages of quick freezing over slow freezing are pointed out--in quick frozen meats the moisture does not separate out, but remains within the meat fibers in the form of very small ice crystals. In slow frozen meats the formation of large ice crystals tears the fibers and causes drip when thawed. It is possible to protect the quality of frozen meats during storage at a reasonable temperature of about 0° F. if a very important condition is carefully observed--the avoidance of temperature fluctuations in low temperature storage. A. S. C.

(3262) Wilkins, P. C., "Survey of Illinois Lockers Shows Need for Higher Service, Rental Charges." Locker Operator 7, No. 11, 19-20 (1946). - An analysis is made of the operation of 25 cooperative locker associations in Illinois during 1945. The survey covers 60 complete and branch plants operating a total of 26,975 lockers. The percentage of operating income decreased from 17.24 in 1943 to 9.01 at close of fiscal year 1945, due to higher cost of plants and increased expenditures for labor and management. Expenditure for labor and management per dollar of processing income increased from 92¢ in 1943 to $1.01 in 1945. Locker rental income averaged approximately 51% of gross income. Processing of fruits and vegetables is unimportant as a source of income. Tables, charts, and graphs are included to show investment, income, and expenses of the associations.
R. A. 1, 218 (1946).

(3263) Williams, E. W., Anderson, N., and Hilby, M., "Forum on Frozen Meat Products, I-III." Meat 23, No. 6, 126, 128 (1945). - Distribution, problems of consumer demands, and various hurdles to be crossed by frozen meat packers are discussed.
B. J. A.

(3264) Williams, E. W., "What is the Futuro for Cooked Foods?" Quick Frozen Foods 7, No. 2, 59 (1945).

(3265) Williams, E. W., "Poultry--its Future as a Quick Frozen Product." Quick Frozen Foods 8, No. 1, 52-5, 81 (1945); Butcher's Advocate 118, No. 24, 42-6 (1945).

(3266) Williams, E. W., "Latest Freezing Developments in the Southeast--from Okra to Oranges." Quick Frozen Foods 8, No. 8, 67-70, 104 (1946). - Information gathered on a trip through Tennessee, Alabama, Louisiana, and Florida is presented. TVA activities, development of strawberry acreage in Georgia, new packers of cooked shrimp and oyster dishes in Louisiana, and the future of frozen citrus products in Florida are all generally discussed.
B. J. A.

(3267) Williams, E. W., "From Los Angeles to Seattle. Report of a five-weeks' Trip Studying Commercial Freezing on the West Coast. I-II." Quick

Frozen Foods 8, No 12, 58-9, 65, 100 (1946); 9, No. 1, 76-7 (1946). - A review of freezing techniques used, locker plant facilities, retail-marketing conditions, etc., observed in travelling up the west coast.

B. J. A.

(3268) Williams, E. W., "Hard Merchandising and Selling (of Frozen Foods) is the Task Ahead." Quick Frozen Foods 9, No. 5, 64-6, 104, 106 (1946).

(3269) Williams, J. R. and Meaker, R. D., "Snap Freezing of Foodstuffs. Local and Overseas Developments." Rev. Mktg. Agr. Econ. 15, 68-70 (1947).

(3270) Wilson, C. T., "Bakers Swell Volume on Frozen Pies." Frosted Food Field 4, No. 5, 3, 23 (1947).

(3271) Wilster, G. H., "Bacteria." Creamery J. 57, No. 10, 5 (1946). - A general discussion of bacteria and their relation to dairy products. There will be a gradual decrease in the viable organisms in food held at temperatures below freezing.

R. A. 2, 103 (1947).

(3272) Wingo, S. M., "The Doctor Looks at Frozen Foods." South. Refrig. J. 1, No. 5, 14 (1946). - Bacteria in frozen foods.

(3273) Winsor, K., "Ithaca Study Points to Future Locker Plant Growth Through Home Freezers." Food Freezing 1, No. 10, 476-79 (1946). - A study in community frozen food services, now in progress in Ithaca and Tomkins county (New York), has shown that more than 80 out of 100 home freezer renters retained their lockers in the commercial plant. Demand for home storage is still growing. Likewise, more bulk storage is needed in locker plants.

R. A. 2, 14-5 (1947).

(3274) Winter, A. R. and Wilkin, M., "Holding, Freezing, and Storage of Liquid Egg Products to Control Bacteria." Food Freezing 2, 338-41 (1947). - The bacterial count of eggs increased in direct proportion to the storage temperature and length of time held. Heating liquid eggs to 131 or 140° F. greatly reduced the number and growth of bacteria. Reduction in bacterial count was 60% for liquid eggs frozen at 0° F.; 39% at -10° F.; and 28% at -20° F. Reduction in bacterial count when stored at 0° F. was 36% for 2 weeks, 88% for 13 weeks, and 97% for 29 weeks. At -10° F. storage the reduction was 26, 74, and 96% for 2, 13, and 29 weeks, respectively. At -20° F. storage the reduction 21, 74, and 88% for 2, 13, and 29 weeks, respectively.

R. A. 2, 186 (1947).

(3275) Winter, J. D. and Hustrulid, A. Freezing Foods for Home Use. Minnesota Univ. Agr. Extension Bull. No. 244,(Rev.), 1945. 24 pages.

(3276) Winter, J. D., "Cellulose Sponge Tests for Moisture Loss in Wrapping Material at 0° F." Food Freezing 1, 480-82 (1946). - Tests for moisture

loss were made by wrapping cellulose sponges in 22 different packaging materials and keeping at about 0° F. for 12 weeks. With a single druggist-type wrap, loss of weight ranged from 0.0 to 7.6 per cent, while with a double wrap of an averaged waxed locker paper, the butcher type had a much lower loss of weight. Less loose frost occurred inside tightly wrapped packages and all packaging materials containing paper stock increased in weight during the 12-week storage period.

A. S. C.

(3277) Winters, S. R., "Electronics in Processing Foods; Blanching of Vegetables." Radio N. 35, No. 6, 31 (1946). - A report on some of the experimental work being carried on in the electronic heating of foods. The use of electronics in generating artificial fevers and in the manufacture of airplane plywood have led scientists at Cornell University to inquire into the possibilities of removing the outer skins from vegetables and bleaching carrots, cabbage, etc., by means of high radio frequencies. Trial and error experimentation was necessary in order to find the correct formula for high frequency heating of foods. The nearly negligible loss of ascorbic acid, during electronic blanching, in contrast to the 30 to 40% losses occurring in the steam and water processes, points the way to production of processed vegetables of higher nutritive value.

A. S. C.

(3278) Woodroof, J. G., "Frozen Eggs." Ice & Refrig. 102, No. 1, 62-4 (1942). - In 1941, 34 per cent of frozen food was comprised of eggs. For freezing, eggs must first be carefully candled, then broken, and frozen (either whole or as whites and yolks) with some stabilizing substance such as glycerine, salt, or sugar. After freezing at -10 to -20° F., storage at 0° F. is recommended. Cakes baked with frozen and fresh eggs were compared on several points, and it was proved that frozen eggs are highly acceptable for baking cakes. In some cases cakes baked with frozen eggs scored even higher than those with fresh.

B. J. A.

(3279) Woodroof, J. G., et al., "Ascorbic Acid Improved Frozen Peach Pack." Food Freezing 1, No. 4, 123 (1946). - Reiterated value of ascorbic acid as anti-browning agent in preparation, freezing, and thawing of peaches. For Elberta variety, application of 0.5% ascorbic acid and 0.1% citric acid per lb. of packed fruit is recommended. Tests were carried out with 5 varieties of peaches, namely, Mikado, Mayflower, Dixiegold, Hale Haven, and Elberta. Trials were made with slices and purees using sirup and dry sugar containing ascorbic acid at various percentages in combination with citric acid also at various percentages.

R. A. 1, 153 (1946).

(3280) Woodroof, J. G., "Georgia Broilers, a $45,000,000 a Year Industry." Food Freezing 1, 180-181 (1946). - Poultry freezing industry.

(3281) Woodroof, J. G., "Georgia Develops New Method of Freezing Muscadine Grapes." Frosted Food Field 2, No. 2, 16 (1946); Food Freezing 4, No. 2, 69, 72 (1946). - Muscadine grapes may be preserved for one to two years by freezing and thus retain their original flavor and aroma. The grapes are washed, crushed, and the pulps and hulls separated. The pulps are boiled five minutes which causes the seeds to separate and settle; the hulls are

boiled to tenderize them, and the two lots are then recombined, sweetened, packaged, and frozen. The product may be used in ice cream and sherbert or with shortcake and sundaes.

M. B

(3282) Woodroof, J. G., "Ascorbic Acid Formulas for Processing Peaches." Frosted Food Field 3, No. 2, 1, 17 (1946). - Ascorbic acid has been found very effective for preventing browning of frozen peaches, and citric acid was found to be a good stabilizer for the ascorbic acid. Formulas are given for home and commercial preparation of ripe and very ripe peaches for freezing.

M. B.

(3283) Woodroof, J. G. and Atkinson, I. S., "Muscadine Grapes as a Frozen Product." Ice Cream Field 48, No. 2, 59 (1946). - Steps for preparing muscadine grapes for freezing are given. Hunt and Flowers varieties are best suited for freezing and the yield is about 45 pounds per bushel.

B. J. A.

(3284) Woodroof, J. G., "Quality of Frozen Fruits Must be Improved." Quick Frozen Foods 8, No. 6, 58-9 (1946). - In the past, many failures in the proper preparation of frozen fruits were due to a lack of information and experience on the part of the processors. Requirements for quality control include (1) recognition of the delicate nature of the product and (2) control of operations in every step from the producer to the consumer. Improved quality will result from many relatively small improvements in processing, storage, transportation, and preparation for serving. The tentative U. S. Standards for grading frozen peaches and apples will also help in improving quality.

R. A. 1, 87 (1946).

(3285) Woodroof, J. G., "Problems in Freezing Cooked Foods." Quick Frozen Foods 8, No. 9, 90-1 (1946). - Problems encountered in frozen cooked foods are structural breakdown, breakdown of fat emulsions, precipitation of some proteins, flavor loss due to high storage temperature, poor packages, improper cooking methods before freezing, and improper reheating.

R. A. 1, 214 (1946).

(3286) Woodroof, J. G., Atkinson, I. S., Cecil, S. R., and Shelor, E., "Studies of Methods of Vegetable Blanching. I." Quick Frozen Foods 9, No. 1, 78-9, 114 (1946). - Scalding of vegetables prior to freezing prevents undesirable changes by enzymes during storage, but reduces aroma, flavor, and soluble nutrients. Over-blanching effects color and texture. Tests on 8 vegetables show that after 12 months storage at 0° F., samples scalded in flowing steam scored higher than those treated with hot water, or steam under pressure. Evidence points to less loss of vitamin C by steam than by water scalding. Neither method greatly affects carotene content. If blanch water is used repeatedly, loss of soluble materials is decreased, but caramelization of solutes may occur. Experimentally, water blanching of peas for 30 seconds at 210° F. is equivalent to 2 minutes at 170° F. In testing for enzymes, the peroxidase test is preferred to the catalase.

B. A. 21, 201 (1947).

(3287) Woodroof, J. G., et al., "Studies of Methods of Vegetable Blanching. II." Quick Frozen Foods 9, No. 2, 72-73 (1946). - In experiments to determine the best methods of scalding and cooling asparagus for freezing, samples were heated in water, in steam, in steam under pressure, and by infrared light, then cooled in ice water or under a fan. After storage for 2 weeks at 0° F. (-18° C., approximately), they were cooked and scored for flavor, texture, color, appearance, and aroma. Highest quality was in small stalks scalded for 1 minute in boiling water, and cooled in chilled water, but catalase and peroxidase tests were positive. Medium stalks treated for 2 minutes in boiling water or for 3 minutes in steam were good when cooled in chilled water, but had a wrinkled appearance when cooled with a fan. Treatment with flowing steam for 5 minutes, or with steam at 10 lbs. pressure for 2 minutes affected color, flavor, and texture. Infrared heating gave poor appearance and flavor. Since asparagus stalks vary in diameter, they should be graded to insure proper scalding; i.e., inactivation of enzymes, without undue softening or leaching of nutrients.

B. A. 21, 975 (1947).

(3288) Woodroof, J. G., et al., "Studies of Methods of Vegetable Blanching. III." Quick Frozen Foods 9, No. 3, 86 (1946). - Henderson lima beans scalded in hot water and in steam for 1, 2, 3, and 15 minutes were judged after 6 and 12 months' freezing storage. After 6 months samples scalded for 1 and 2 minutes rated highest; at 12 months those scalded for 3 minutes were superior . The shorter scalds apparently did not completely inactivate the enzymes. Scalding for 15 minutes resulted in loss of color and flavor. When scalding was omitted, the product was inedible in 6 months. Color of water-scalded beans was slightly better than that of steam-scalded.

B. A. 21, 975-6 (1947).

(3289) Woodroof, J. G., et al., "Studies of Methods of Vegetable Blanching. IV." Quick Frozen Foods 9, No. 4, 80-81, 116 (1946). - In testing influence of various preparatory methods on the quality of frozen snap beans, it was found that scalding in steam or hot water for 2 minutes yielded an excellent product up to 3 months but not for 6 months freezing storage. Inactivation of enzymes by scalding for 3-4 minutes prevented deterioration for 18 months. Steam scalding was slightly superior to hot water scalding, but steam under pressure gave poor texture and flavor. Over-scalding caused leaching of nutrients and loss of color. Beans cut 4 inches or longer were superior to those cut shorter, as were "dry" pack beans to samples in 2% NaCl brine. In judging adequacy of scalding by the peroxidase test, placing of reagents directly on tissue proved more sensitive than addition to juice. Since there is evidence that peroxidase may be regenerated in 3 hours after scalding, a negative test on freshly-scalded beans may be misleading.

B. A. 21, 976 (1947).

(3290) Woodroof, J. G., et al., "Studies of Methods of Vegetable Blanching. V." Quick Frozen Foods 9, No. 5, 66-7 (1946). - Tests on soybeans frozen for 6 months show that while scalding is necessary to preserve quality, a rather wide range of methods is permissible, e.g., live steam or hot water for 2-6 minutes. Steam is preferred. After 12 months' storage, samples treated for 6 minutes or for 1 minute in steam at 10 lbs. pressure are superior. Enzymes are not completely inactivated by 2 minutes' scalding in flowing stream. Over-scalding tends to destroy color and flavor. Corn scalded on the cob, then cut, is superior to that cut before scalding. A 3.5 minutes' steam scald ensures good quality for 6 months; samples scalded

for 5 minutes scored highest after 12 months. A temperature of 180° F. (82.2° C.) seems best for hot water scalding of cut corn. Addition of salt or sugar to corn packs is of no advantage.

B. A. 21, 15409 (1947).

(3291) Woodroof, J. G., et al., "Studies of Methods of Vegetable Blanching. VI." Quick Frozen Foods 9, No. 6, 74-5 (1947). - Corn-on-the-cob, intended for freezing, should be scalded in live steam for 10 minutes or in steam at 2 lbs. pressure for 2 minutes to prevent development of off-flavor during storage. Scalding in hot water for 5 minutes is ineffective. Heat must penetrate the oob, and when water is used, the grains are over-scalded and tend to be bland in flavor. Cutting frozen corn from the cob before cooking improves palatability. In scalding okra, a 3 minute exposure to live steam gives best retention of fresh quality. Hot water scalding tends to leach flavor and color. Freezing is a good means of preserving okra, which cannot be satisfactorily canned. Onions frozen unscalded are poor, but when scalded for 3 minutes in steam are mildly pleasant in flavor and of good color. In all experiments the storage temperature was 0° F. (-18° C., approximately). Tests ran from 3 to 12 months.

B. A. 21, 15410 (1947).

(3292) Woodroof, J. G., et al., "Studies of Methods of Vegetable Blanching. VII." Quick Frozen Foods 9, No. 7, 66, 80 (1947).

(3293) Woodroof, J. G., et al., "Studies of Methods of Vegetable Blanching. (Conclusion)." Quick Frozen Foods 9, No. 12, 70-2 (1947).

(3294) Woodroof, J. G., "Ascorbic Acid Prevents Browning." South. Canner and Packer 7, No. 7, 19, (1946). - In freezing peaches.

(3295) Woodroof, J. G., "Preservation of Orchard Fruits by Freezing." Va. Fruit 34, 105-112 (1946); Fruit Grower 9, No. 2, 5, 15, 18, 21-2, 26 (1946). - The seleotion of varieties of peaches for freezing including degree of ripeness, form to be used, etc., is discussed. Peaches may best be peeled in 10 per cent lye at 160° F. for 1-2 minutes, then washed and packed in sugar-ascorbic acid solution for quick freezing. The various uses for frozen peaches include preserves, ice cream, pies, institutions, and homes. A short discussion of frozen apples and their comparable uses is given also.

B. J. A.

(3296) Woodroof, J. G., "Frozen Foods in the Home." Va. Fruit 34, 157-159 (1946).

(3297)Woodroof, J. G., Atkinson, I. S., Ceoil, S. R., and Shelor, E. Studies of Methods of Scalding (Blanching) Vegetables for Freezing. Ga. Agricultural Experiment Station Bulletin No. 248, 1946. 44 pages. - The purpose of the experiments was to compare various methods of blanohing of asparagus, lima, snap, and soy beans, corn, okra, peas, squash, onions, turnip greens, and carrots for various lengths of time to determine which methods resulted in the best frozen product at 6 and 12 months' storage and whether adequate blanching could be best determined from enzyme tests

or color determinations of the blanched vegetables with a Lovibond tintometer. No conclusions were drawn whether color tests would be satisfactory as guides to blanching. Electronic blanching is briefly discussed.

C. A. 41, 1347 (1947).

(3298) Woodroof, J. G. and Shelor, E., "Effect of Freezing Storage on Strawberries, Blackberries, Raspberries, and Peaches." Food Freezing 2, 206-9, 223 (1947). - The effect of storage at -10° F., -20° to 0° F., 0-10° F., and 10° F. for 1 year was observed for strawberries, blackberries, raspberries, and peaches, packed without sugar or sirup. Desirable appearance, color, aroma, texture, and flavor of strawberries were preserved much better at -10° F. than at higher temperature or at fluctuating temperature. Strawberries were in better condition after 12 months at -10° F. than after 6 months at 10° F. Blackberries and raspberries stored at -10° F. were superior to those stored at higher temperature, but the differences were not as great as were found with strawberries and peaches. Peaches deteriorated more rapidly in flavor and color at the above 4 temperature conditions than did the other fruits. All of the fruits deteriorated more rapidly at a temperature fluctuating from 0 to 10° F. than when held constant at 10° F. Peaches lost their quality more rapidly under fluctuating temperature than did the other fruits.

R. A. 2, 181 (1947).

(3299) Woodroof, J. G., Atkinson, Ida, and Shelor, Ethyl, "Wrapping Materials for Frozen Meats and Chickens." Food Freezing 2, 274-7, 309 (1947); Lkr. Oper. 8, No. 10, 16-8 (1947). - Comparison was made between plain 0.0015-inch aluminum foil, MSAT cellophane, and kraft locker paper waxed on one side as protective wraps for frozen broiler-size chickens and ground meat stored at 0° F. for 1 year. Aluminum foil was the most satisfactory from the standpoint of aroma and flavor preservation, the prevention of surface desiccation, and loss in weight. No undesirable colors, flavors, or odors were imparted to the meat or poultry in contact with the foil. Cost of wrapping with foil is about the same as for pliofilm or the best grade of locker paper.

R. A. 2, 195 (1947).

(3300) Woodroof, J. G., "Freezing Eggs for Locker Plants Recommended." Food Freezing 2, 354 (1947); Locker Oper. 8, No. 11, 42 (1947). - Directions are given for freezing, storing, thawing, and using eggs. Uncooked eggs may be frozen whole or separated into whites and yolks. After each egg is individually inspected, the whole eggs or parts are stirred thoroughly but not beaten. Corn sirup or honey, added at the rate of 1 tablespoon to each 2 cups of yolks or whole eggs, will improve the consistency. Whites do not need sirup. Cooked eggs should not be frozen.

R. A. 2, 186 (1947).

(3301) Woodroof, J. G., "Strawberries--the Most Popular Frozen Fruit; Easy to Prepare in Home, in Locker, or Commercial Plant." Freezer's J. 1, No. 12, 4, 14-5 (1947).

(3302) Woodroof, J. G., Shelor, E., Cecil, S. R., and Atkinson, Ida. Preparation of Peaches for Freezing. Ga. Expt. Sta. Bull. No. 251, 1947. 70 pages; Food Freezing 2, No. 5, 403-5, No. 6, 495-8 (1947). - The preservation of peaches by freezing involves the following unit operations: (1)

selection of fruit, (2) peeling, (3) washing, (4) acidification, (5) pitting and trimming, (6) slicing, (7) sweetening and treating to prevent browning, (8) packaging, (9) freezing and storing, and (10) inspecting and grading. Speed in handling is important; the total time for peaches to pass through the first 8 steps should not be over 5 min. Only well ripened high grade peaches should be frozen, the following varieties being preferred: Dixigem, Redhaven, US 993, Halehaven, and Georgia Belle. After pitting, trimming, and slicing, 100 lb. of fruit is mixed with 20 lb. of sugar, 1 oz. of citric acid and 0.5 oz. of ascorbic acid. For packages of 10 lb. or larger the dry sugar-acids mixture is gently mixed with fruit and poured into the container, which is then topped with a few ounces of the sugar-acids mixture. For smaller containers the sugar and acids are dissolved in equal weight of water and 4 oz. of the resulting sirup is poured over each 12 oz. of sliced fruit in the container. Rapid freezing and storage at 0° F. or below are recommended for preservation of original flavor, aroma, and texture. Storage at -10° F. resulted in slightly better flavor and aroma retention for sugar-packed sliced Halehaven peaches in 1 lb. cups.

R. A. 2, 180 (1947).

(3303) Wright, E., "The Question of Added Substances in Frozen Foods." Assoc. Food and Drug. Off. U. S. Q. B. 10, 104-6 (1946).

(3304) Young, L., "Processors and Distributors (of Frozen Fish) Should Understand each Other's Problems." Fishing Gaz. 63, No. 9, 108 (1946).

(3305) Young, L., "The Future of Frozen Packaged Specialty Fish." Quick Frozen Foods 9, No. 2, 26, 32 (1946). - High prices plus decreased demand for frozen specialty fish products make it imperative that the packer review the situation carefully. A general discussion of the obstacles encountered is given.

B. J. A.

(3306) Young, L., "Private Labels for Frozen Fishery Products." Quick Frozen Foods 9, No. 3, 28 (1946).

(3307) Young, L., "Frozen Packaged Shellfish." Quick Frozen Foods 9, No. 6, 28 (1947). - Popular shellfish species such as clams, oysters, shrimp, lobster meat, lobster tails, and frog legs are being marketed in consumer sizes as well as institutional packages, or will be shortly. Frozen packaged shellfish are processed in a manner which makes their preparation for the table a simple operation. New inland markets for these products, acquired during the war, can be retained and expanded by good merchandising.

A. S. C.

(3308) Young, L., "Frozen Fish versus Canned Fish." Quick Frozen Foods 9 No. 7, 26 (1947). - Uniformity of size and the quality of frozen pack fish, while in competition with fresh, will determine its success in competition with the now more abundant canned fish. Since much greater variety is offered by the freezing industry (cod, haddock, flounders, rosefish, mackerel, halibut, salmon, swordfish, shrimp, oysters, clams, scallops, and soft-shell crabs) as compared with the few types now being canned (salmon, tuna, sardines, herring, shrimp, clams, and crabmeat). Probably the canning industry will recapture a lead in the market for specialty products, but frozen fish will continue to rule as a whole.

B. J. A.

(3309) Young, O. C., "(Fish) Freezer Studies. II." Progr. Repts. Fisheries Res. Bd. Canada 45, 7-11 (1940). - The use of a fan in the freezer described saved much time in lowering the temperature of the stored fish to either -5° or -23.3° C. The speed of the fan must be so controlled that the drying of the fish is not excessive. The fan can only be used to advantage in freezers that have efficient and capacious cooling coils and where the temperatures are kept sufficiently low.

Br. A. BIII, 72-3 (Mar., 1941).

(3310) Young, O. C., "Refrigerator Car Tests (on Frozen Fish). IV." Progr. Rept. Fish. Res. Bd. Canada, Pacific Sta. 62, 17-20 (1945). - The principles by means of which desirable conditions for the shipment of goods like fish, requiring refrigeration, may be attained economically have been worked out. Satisfactory temperature limits are provided in present-day roof tank or overhead cooled cars, using ice and salt in eutectic proportions, if the

outside temperature is not greater than 60° F. In hot weather, temperatures greater than 90° F. are common, and experiments are in progress on what appears to be the most satisfactory solution; viz., a combination of axle-driven mechanical refrigeration combined with some eutectic solution (for example, 20% NaOH lye, eutectic temperature -21° F.).

Br. A. BIII, 190 (Sept., 1945).

(3311) Yung, F. D. A Zero Storage Cabinet. Nebr. Agr. Expt. Sta. Agr. Engin. Prog. Rpt. No. 12A, 1946. 4 pages.

(3312) Zarotschenzeff, M. T., "Sterilization of Meat by Means of a High-frequency Dielectric Current, Dehydration of Foodstuffs, Quick Freezing." Clube de Engenharia-Rio de Janeiro--Revista 11, No. 96, 35-9 (1944). E. I. 1945, 434.

(3313) Zarotschenzeff, W. M., "Postwar Refrigeration; Great Advances Seen in Postwar Frozen Fish and Sea Food; Many Wartime Developments." Fishing Gaz. 62, No. 12, 210, 212 (1945).

(3314) Zarotschenzeff, M. T., "The Process of Quick Freezing." Res. 13, 18338-40 (1945).

(3315) Zarotschenzeff, M. T., Quick Freezing. Porto Alegre, Rio Grande do Sul. Sec. de Estado dos Negocios da Agr. Indus. e Com., Bulletin No. 116, 1945. 12 pages.

(3316) Zarotschenzeff, M. T., "Quick Freezing of Fish." Fishing Gaz. 63, No. 10, 58, 97 (1946).

(3317) Zarotschenzeff, M. T. "Quality Control (of Frozen Foods) a 1946 Problem." Frosted Food Field 2, No. 1, 8 (1946). - Quality control is an increasingly important factor in the quick-freezing of consumer-sized portions of meats and meat dishes, fish and poultry, fruits, fruit juices, and baby foods.

M. B.

(3318) Zarotschenzeff, M. T., "N. Y. Fish Freezer Taps Canada Supply." Frozen Food Indus. 2, No. 8, 10-1, 31 (1946). - A Bay of Fundy plant receives fish alive, cleans, fillets, and places them in the freezer only 12 hours after they were caught. The actual quick-freezing is done on 4 stands of vacuum plates, having a capacity of 7-8000 pounds per 24 hours. The plates are maintained at -40° F. and air at -20° F. is rapidly circulated over them by a high-speed fan. The cold storage room holds 100,000 pounds at 0° F. All sizes of fish are packed here, also clams and scallops.

B. J. A.

(3319) Zarotschenzeff, M. T., "Fishing Resources in Alaska Provide Means of Building Huge Frozen Fish Industry." Ice & Refrig. 112, No. 3, 19-22, 72, (1947). - In 1945 Alaska produced approximately 33 per cent of the fish frozen on the Pacific Coast. The trend is toward freezing as fillets and steaks rather than whole. Scraps (the parts left from fillets and steaks) can be used for bouillon which combined with vegetables makes a stew suitable for freezing. By utilizing the available fish and vegetable resources, and developing a market for the products, Alaska could expand her food freezing industry.

R. A. 2, 199-200 (1947).

(3320) Zarotschenzeff, M. T., "Frozen Berries in Alaska." West. Frozen Foods 8, No. 3, 3-4 (1947). - Berries which grow in abundance in Alaska include strawberries, raspberries, gooseberries, cranberries, blueberries, dewberries, blackberries, salmonberries, Juneberries, bearberries, crowberries, and elderberries. With the proper development, cultivation, and planting of the different varieties of these berries, a frozen fruit industry is possible.

R. A. 2, 99 (1947).

(3321) Ziegler, P. T., "Preparing Meats for Freezing." Locker Operator 7, No. 4, 44 (1945). - The importance of proper selections and feeding of live stock, proper handling prior to slaughter, adequate chilling of caroasses, and methods of wrapping and packaging cuts and sausage for freezer storage is emphasized.

R. A. 1, 83-4 (1946).

(3322) Ziemba, J. V., "Portable Container used for Shipment of Frozen Food." Food Ind. 18, No. 9, 1358-9 (1946). - Several types of portable insulated shippers for small lots of frozen foods are described. Test results are reported on one type which holds 10 cubic feet of products and is refrigerated by 100 pounds of dry ice.

R. A. 2, 46 (1947).

(3323) Ziemba, John V., "Proper Packaging Protects Frozen Meats." Food Indust. 18, No. 11, 1710-12.(1946). - Proper wrappers avoid freezer burn; minimize surface discoloration, and improve product.

B. A. 21, 818 (1947).

(3324) Ziemba, J. V., "New Food Packaging Problems and How to Handle Them." Food Ind. 19, No. 3, 309-11 (1947).

(3325) Ziemba, J. V., "Why a Packaging Laboratory?" Food Ind. 19, No. 7, 924-7, 1030-2 (1947). - Since some perishables, such as fish, meat, fruit, and vegetables, are moist, they present special packaging problems. Processors can profit by taking their problem to the packing laboratories where a practical and scientific answer will be given. Suppliers work in coordination with the laboratory to the best advantage of both.

B. J. A.

(3326) Zscheile, F. P. and Whitmore, R. A., "Determination of Carotene in Alfalfa." Anal. Chem. 19, 170-2 (1947). - Samples of fresh leaves, blanched and frozen, were held at -18° C. (-0.4° F.) or lower for 66 days without loss of carotene.

R. A. 2, 196 (1947).

Foreign Patents

British

(3327) Brit. 527,876, April 22, 1939, L. Van Cleef, Method of Freezing Fresh Fruit (Cherries) and Storing Them in Frozen Condition. - The cherries, not freed from stalks and stones, are frozen with syrup in rigid paper cups and stored in solid condition.

Br. A. BIII, 52 (Feb., 1941).

(3328) Brit. 531,560, July 5, 1939, R. H. Bedford, Manufacture of Ice and Glazes for (Frozen) Comestibles. - HCl is added to H_2O to give pH 1 and the solution is frozen at -30° C., giving a non-cracking ice which does not infringe Public Health Regulations (1925-7). Comestibles are first frozen and dipped into the solution, which is at slightly higher temperature; e.g., fish may be at -30° C. to -35° C., the room at -25° C., and the liquor at 1° C.

Br. A. BIII, 184 (July, 1941).

(3329) Brit. 540,801, May 6, 1940, (to Harvey & Co., Ltd.), Preservation of Comestibles. - It is claimed that if an A. C. current (220 V.) is passed through a solution of NaCl (12% salometer) containing fillets of fish or meat for about 1-2 minutes, then the rupturing of the cellular structure by the formation of large ice crystals during subsequent freezing and storage is prevented.

Br. A. BIII, 83 (Mar., 1942)

(3330) Brit. 545,686, June 20, 1940, (to Mechanical Research, Inc.), Freezing of Food Products. - Apparatus for freezing solid or semi-solid foods on a cascade of horizontal refrigerated plates with scrapers which separate the frozen food from the plates continously and advance it through the apparatus intermittently is claimed. Condensed moisture is returned to the product; a refrigerated stream of gas may be passed over the product.

Br. A. BIII, 202 (Sept., 1942).

(3331) Brit. 564,169, Sept. 15, 1944, E. Whalley (to Frigidaire Ltd.), Pumps for Low-temperature Liquids. - A comparatively warm liquid medium is circulated around the pump drive shaft. The liquid medium, preferably oil, is fed to the shaft under pressure.

C. A. 40, 3030 (1946).

(3332) Brit. 576,307, May 19, 1943, H. G. Wager and A. J. Ede, Scalding of Vegetables. - Shredded or sliced vegetables may be scalded or blanched by means of a blast of hot damp air, prior to dehydration, in place of the conventional H_2O or steam method. The temperature of the air depends on the vegetable, but is approximately 110-130° C. (dry bulb) and 95° C. (wet bulb) and the time (approximately 5 minutes) should be sufficient to destroy peroxidase activity. The procedure may be incorporated with the dehydration process covered by Br. 557, 227.

Br. A. BIII, 159 (July, 1946).

German

(3333) Ger. 705,497, April 30, 1941, Leopold (to Bergedorfer Eisenwerk A.-G. Astra-werke, Hamburg-Bergedorf), Device for the Quick Freezing of Foods. B. S. I. R. 4, 352 (1947).

(3334) Ger. 710,147, Sept. 5, 1941, Fischer (to Brown, Boveri & Cie Akt.-Ges., Mannheim), Device for Freezing Food Articles. B. S. I. R. 4, 352 (1947).

(3335) Ger. 713,319, Nov. 6, 1941, Gram (Brødrene) A/S, Vojens, Machine for Freezing Cream into a Solid Molded Body. B. S. I. R. 4, 444 (1947).

(3336) Ger. 713,720. Nov. 13, 1941, P. Nitsche, Method of Producing Packing Ice. B. S. I. R. 4, 353 (1947).

(3337) U. S. 2,207,034, July 9, 1940, R. C. Vogel, R. W. Coblentz,and W. A. Capstick, Manufacture of Edible Coating for Frozen Products. - A protective coating for ice cream, sherbets, etc., is produced by cooking a mixture of sugar, glucose, and cream to approximately 118° C., adding condensed milk in two stages, cooling the mixture while milling cocoa butter into it, and solidifying the batch. After being remelted it is kept at approximately 30° C., and ice cream bars, etc., are dipped therein.

Br. A. BIII, 214 (Aug., 1941).

(3338) U. S. 2,298,159, Oct. 6, 1942, K. G. Plitt, Sr. & Jr.,and E. A. Plitt, Preparation of Fresh Meats. - Boneless fresh meat is extracted with a salt solution or pressed at 200-250 lb./sq. in. and then frozen throughout (at -9.5° C.); it is then thawed sufficiently to permit slicing and the slices are reassembled at different angles.

Br. A. BIII, 31 (Feb., 1944).

(3339) U. S. 2,308,486, Jan. 19, 1943, L. H. Bartlett (to Univ. of Tennessee Res. Corp.), Immersion Process of Food Freezing. - The food is immersed in non-wetting chilling liquid (I) until congealed right through, then centrifugally drained, and washed with a liquid (II) which is also at a temperature less than the freezing point of the food and is miscible with the natural juices but immiscible with (I); finally the food is washed with a liquid (III) which is immisoible with (I) but at a higher temperature. If there are no natural juices it is usually preferable to dip the food first in H_2O to form a coating of ice when dipped in (I). For fruit berries, (I) may be deodorized "white mineral oil"; pure paraffins from C_9H_{20} are suitable. The food may be shipped with a film of (I) adhering, the subsequent washings being effected nearer the point of consumption. (II) may be aqueous sugar solution. For fats, (I) would be an aqueous liquid and (II) and (III) oily.

Br. A. BIII, 141 (July, 1944).

(3340) U. S. 2,317,397, April 27, 1943, H. A. Noyes, Conditioning of Foods. - Frozen foodstuff, such as meat, fruit, or vegetables, is improved and conditioned by dipping the frozen food in a suitable solution and maintaining such a temperature that the food is frozen but the film of solution is liquid and can be absorbed. For example, the application of a film of invert sugar syrup to strawberries improves their flavor and texture and gives an even color. Similarly, frozen peas are improved by the application of sweetened brine.

Br. A. BIII, 109 (May, 1945).

(3341) U. S. 2,368,140, Jan. 30, 1945, C. E. Johnson (to Reddir Inc.), Package and Wrapper. - This method of packaging with a moisture-proof wrapper and a sugar coating is adapted for the packaging of frozen foods and other products.

R. A. 1, 49 (1946).

(3342) U. S. 2,373,905, April 17, 1945, W. L. Morrison, Refrigerating Apparatus (Deep Freeze Cabinet). - A pair of cylindrical cabinets with top openings. Condensing unit is located between the two cylindrical cabinets. Claim on details of insulation and supports.

R. A. 1, 57 (1946).

(3343) U. S. 2,374,452, April 24, 1945, H. A. Noyes, Framed Comestibles in Freezing. - The olaims are on a method of freezing poultry by confining them between refrigerated plates. R. A. 1, 58 (1946).

(3344) U. S. 2,375,688, May 8, 1945, G. B. Quatman, Refrigerated Food Looker Room. - Claims are on the arrangement of air ducts for cooling the lockers. R. A. 1, 59 (1946).

(3345) U. S. 2,379,459, July 3, 1945, R. P. Sohreiber, et al. (to U. S. Government), Temperature Indioator (Food Package). - The package or a label on it is printed with a coloring matter which melts at a predetermined temperature. Thus the condition of the label tells whether or not the temperature limit has been exceeded during storage of the food product. This patent does not refer particularly to frozen foods as is the case of earlier patents disclosing this general idea.

R. A. 1, 64 (1946).

(3346) U. S. 2,380,036, July 10, 1945, E. W. Flosdorf (Lyophile-Cryochem. Co.), Desiccation of Citrus Fruit Juices. - This patent refers to desiccation by sublimation. The claims call for adding sugar to the fruit juice before freezing so that the sublimation will take place without the product becoming gummy.

R. A. 1, 65 (1946).

(3347) U. S. 2,380,987, Aug. 7, 1945, W. L. Morrison, Twin-cylinder Refrigerator (Twin Holes as in a 2-hole Ice Cream Cabinet). - A frozen food cabinet oomprising 2 round, vertical chambers closed by top lids and cooled by an evaporator in the liner of each compartment. One of the main features claimed is that the evaporators form the sole internal reinforcement for the cabinet.

R. A. 1, 103 (1946).

(3348) U. S. 2,381,598, Aug. 7, 1945, W. P. Jones (to Philco Corp.), Refrigerator Cabinet Construotion (for Frozen Foods). - The cabinet shown has a front door and separate inner doors for the spaces located between glass shelves. These shelves incline downwardly toward the rear wall, which is oooled by coils located between it and the insulation. These shelves are removable along with the inner doors. The features claimed are the inclined shelves and prevention of air-circulation between the various compartments between the shelves.

R. A. 1, 104-05 (1946).

(3349) U. S. 2,381,667, Aug. 7, 1945, D. H. L. Jensen, et al. (to Philco Corp.), Refrigeration (Frozen Food Compartment with Top Opening). - This refrigerator is equipped with a front door for access to the lower part of the cabinet. Single-row ice trays are suspended within the evaporator ooil in the upper L of the cabinet while the lowermost portion of the refrigerated space is in a downwardly extending L located in front of the condensing unit. The lower portion of the top is intended for use as a work table. The olaims have to do with the oabinet and the suspension of ice trays from the top rather than with the refrigerating system which is not shown in detail.

R. A. 1, 105 (1946).

(3350) U. S. 2,382,084, Aug. 14, 1945, G. S. Mathews, Quick Freezing Apparatus. - Cold air is blown through various compartments in which the materials to be frozen are placed. Small doors are provided for removal of drawers or baskets. While one of these is being withdrawn or inserted, its spaoe is shut off from the balance of the oabinet by means of internal air shutters.

R. A. 1, 105 (1946).

(3351) U. S. 2,382,597, Aug. 14, 1945, W. W. Blair, Refrigerated Display Case. - A display case having an inclined window at the front and inclined doors at the back. A vertical baffle hangs between them. Cooling coils are located on the bottom or sides of the lower portion of the cabinet. The baffle or barrier wall appears to be the feature upon which most of the claims were based.

R. A. 1, 106 (1946).

(3352) U. S. 2,382,937, Aug. 14, 1945, J. R. Caulk, Jr., et al. (to C. V. Hill & Co., Inc.), Open Refrigerated Display Case. - A display counter which is open at the upper front portion above a vertical glass front and forward of a solid top portion. The cooling coils are hidden back of an insulated baffle in the solid upper portion. Baffles direct air flow from the coil down the rear of the cabinet, upwardly through the food displayed, and then back of the insulated baffle to the coil. Claims are on the baffle arrangement with the idea of making foods accessible to customers and so directing air flow that little refrigeration is lost through the constantly open front.

R. A. 1, 107 (1946).

(3353) U. S. 2,385,140, Sept. 18, 1945, F. W. Knowles (to Beltice Corp.), Process of Freezing Food. - Food is refrigerated while being conveyed on a belt through successively colder zones. Another feature is the agitation of the food while on the belt, particularly in the first stage where the particles are glazed over. The agitation is for the purpose of obtaining more uniform distribution of the glaze on the individual pieces of food.

R. A. 1, 111 (1946).

(3354) U. S. 2,392,395, Jan. 8, 1946, S. C. Lehman, Method and Apparatus for Packaging Food Products. - The method of packaging food products which comprises the steps of sterilizing and water-proofing empty containers to be filled by passing them through a sterilizing and waterproofing heated liquid bath and completely removing the air from the containers while passing through the bath by completely filling the same from said bath directly into a sterilized atmosphere to be filled without exposure to contaminating air, filling said empty containers with the food product in a sterile atmosphere, applying closures to the filled containers, and sealing the same while still in a sterile atmosphere, then passing the filled and sealed containers through a sterilizing and waterproofing bath on the way out of the sterilized chamber.

Off. Gaz. 582, 230 (1946).

(3355) U. S. 2,396,561, March 12, 1946, E. W. Flosdorf (to Lyophile-Cryochem. Co.), Preservation of Organic Materials, such as Orange Juice. - Material dried by vacuum sublimation in the frozen state is prevented from absorbing moisture from the air during transfer from the vacuum to containers by heating, after the water content is sufficiently reduced, to a temperature such that its water-vapor pressure is greater than that of the atmosphere. Substances, such as orange juice, that contain oils and fats can be prevented from coalescing during the heating by adding (before freezing) a protective colloid such as gelatin, gum, or casein, or a crystalloid, such as dextrose.

C. A. 40, 3842 (1946).

(3356) U. S. 2,397,403, March 26, 1946, R. H. Bishop (to White Castle System Inc.), Food Dispenser Cabinet (for Frozen Foods). - Packages are pushed upwardly in magazines and dispensed from the top.

R. A. 1, 180 (1946).

(3357) U. S. 2,397,446, March 26, 1946, L. R. Tansley (to White Castle System, Inc.), Apparatus for Refrigerating Comestibles. - The product is ex-

truded to flow through a refrigerated zone and is then chopped into short slabs with paper fed from a roll to separate the slabs. Intended for ground meat products such as hamburger. Thin slabs are frozen and delivered to lunch counters for making uniform sandwiches.

R. A. 1, 180 (1946).

(3358) U. S. 2,400,135, May 14, 1946, C. E. Quinn (to Broquinda, Inc.), Refrigerator. - A round refrigerator with revolving shelves in the lower main food section and an exposed evaporator in the upper or frozen food compartment. A water cooling coil is located adjacent to the coil which cools the lower compartment.

R. A. 1, 227 (1946).

(3359) U. S. 2,402,121, June 18, 1946, J. A. Brewster and E. F. Fernandez (½ to Smithfield & Argentine Meat Co.,Ltd., & ½ to Corporacion Argentina de Productores de Carnes), Refrigeration of Meat. - Meat is forced into metal molds to close the opening of the mold or can and air is then exhausted from the bottom of the mold so that the meat fills it. The idea is to freeze larger pieces of meat by virtue of its intimate contact with the metal mold.

R. A. 1, 231 (1946).

(3360) U. S. 2,402,401, June 18, 1946, C. D. Kenneth Hickman (to Distillation Prod., Inc.), Method and Apparatus for Dehydrating in the Frozen State. - This is a sublimation process using ice and salt for cooling and operating at below 4 mm. Hg.

R. A. 1, 232 (1946).

(3361) U. S. 2,402,921, June 25, 1946, N. Sharpe, Apparatus for Freezing Comestibles. - A 2-stage refrigerating system in which the warmer evaporator which does the precooling is also used to cool the condenser of the lower temperature system,which cools the quick freezing chamber. Belt-type conveyors carry the foods through the precooling chamber and then through the quick freezing chamber. Fans circulate air over the evaporators and the food in each of these chambers.

R. A. 1, 233-34 (1946).

(3362) U. S. 2,403,871, July 9, 1946, D. M. McBean, Method of Blanching Food Products. - A conveyor-type apparatus with claims on the method of moving the product and the closed chambers containing it while admitting a heating medium to the chambers. The apparatus includes pistons carried by an endless chain through a long cylinder in which the processing occurs. Several pistons are moving through the cylinder at one time so there are many of the closed chambers.

R. A. 2, 53 (1947).

(3363) U. S. 2,404,851, July 30, 1946, F. A. Knowles and H. A. Dudley (to F. A. Knowles), Refrigerated Locker. - Double-ended drawers may be pulled out in either direction. The insulated front of the drawer remains in place when the drawer is pulled out in the opposite direction. Drawers are double length and separated by a middle partition so that the party having access to one end of the drawer pulls it in one direction and the party having access to the opposite end of the drawer pulls it into the other aisle.

R. A. 2, 55 (1947).

(3364) U. S. 2,405,499, Aug. 6, 1946, R. Guyer and R. J. Hennessey (to Waldorf Paper Prod. Co.), Container for Frozen Foods. - A paper carton for packaging of frozen foods.

R. A. 2, 57 (1947).

(3365) U. S. 2,405,834, Aug. 13, 1946, H. W. Kleist (to Dole Refrig. Co.), Device for Freezing Foods. - A refrigerator having a number of shelf-type evaporators which are staggered to form a sinuous path for air flow which is produced by a fan.

R. A. 2, 58 (1947).

(3366) U. S. 2,407,058, n. d., H. W. Clum (to Philco Corp., Philadelphia), Freezing Apparatus. - In a device of the character described, a mold having oppositely facing receptacles in thermal transfer relation with each other, associated temperature reducing means, liquid supply means, means for rotating the mold to bring said receptacles successively into position to receive liquid from said supply means, and means responsive to the rotation of the mold for actuating the supply means to deliver liquid to the receptacles.

Q. F. F. 9, No. 6, 52 (1947).

(3367) U. S. 2,407,159, Sept. 3, 1946, W. P. Jones (to Philco Corp.), Refrigeration Apparatus. - A cabinet for ice cream or other frozen food having a plurality of liners open at the top. Air is circulated by means of a fan so as to flow over the evaporator and around the liners. This allows the complete system to be removed from one end of the cabinet without disturbing the liners.

R. A. 2, 61 (1947).

(3368) U. S. 2,407,482, Sept. 10, 1946, F. B. Doyle (to Ingersoll-Rand Co.), Apparatus for Freezing (and Blanching). - Apparatus for alternately blanching and freezing vegetables which pass from one chamber to another for successive steps of the process without being exposed to atmosphere.

R. A. 2, 61 (1947).

(3369) U. S. 2,408,154, Sept. 24, 1946, A. J. Stone, Quick-freezing Apparatus for Food Articles. - In a refrigerating apparatus, a housing, a stationary plate in said housing providing a refrigerant chamber, a movable plate associated therewith and providing a complementary refrigerant chamber, springs urging said movable plate toward said stationary plate, and means for moving said movable plate away from said stationary plate.

Off. Gaz. 590, 616 (1946).

(3370) U. S. 2,408,260, Sept. 24, 1946, J. L. Kellog (to John L. Kellog and Co., Inc.), Coffee Extracts. - An extract prepared by soaking roasted and ground coffee in cold H_2O is concentrated by alternate freezing and separation of ice crystals. The residue from this extract is further extracted at higher temperatures, the extracts are combined, concentrated, and dried.

C. A. 41, 5234 (1947).

(3371) U. S. 2,410,310, Oct. 29, 1946, J. A. Smith (to Gen. Motors Corp.), Refrigerating Apparatus. - Warning device which causes the release of a pleasant odor when temperature rises to a predetermined value in a frozen food cabinet. A charged bellows expands to drive a sharp point into the sealed container of odorized Freon-12. A hand-operated lock holds the bellows compressed for handling at room temperature.

R. A. 2, 127 (1947).

(3372) U. S. 2,411,152, Nov. 19, 1946, T. R. Folsom, Method for Freezing and Drying Liquids and Semi-solids. - Sub-limitation or freeze-drying of blood plasma and other liquid or solid substances such as foods. Product is quickly placed in a vacuum chamber and tumbled or stirred therein.

R. A. 2, 128-29 (1947).

(3373) U. S. 2,412,203, Dec. 10, 1946, C. Brunkhurst, Preservation of Milk Products. - The method of making a frozen whole milk product from which a reconstituted whole milk may be made by adding water, said method comprising separating fresh whole milk into cream and skim milk, subjecting the cream to a sufficiently high temperature to pasteurize it without removing volatile matter, subjecting the skim milk to pasteurizing temperature to reduce the water content in a concentration ratio by volume of between $2\frac{1}{2}$ to 1 and 4 to 1, homogenizing the hot concentrated milk and cream together to break up the solids, reducing the temperature of the homogenized mixture to normal room or tap water temperature, and subjecting the mixture without substantial delay to a sufficiently low temperature to quickly bring the mixture to a temperature of between zero and -40° F. to form the frozen whole milk product.

Off. Gaz. 593, 176 (1946).

(3374) U. S. 2,413,383, Dec. 31, 1946, C. M. Savrda (to Atlantic Coast Fisheries Co.), Apparatus for Positioning Fish. - A gripping and feeding device for the conveyor chain of a fish freezer or treating machine. Fish are conveyed tail first.

R. A. 2, 134 (1947).

(3375) U. S. 2,413,918, Jan. 7, 1947, L. B. Harris, Floating Fish Factory. - Recently patented is a fishing vessel of the trawler type, completely equipped for processing fish at sea. When the net is hauled up and the fish are dumped on deck, edible fish are pitched down chutes to cutting tables where they are filleted and cleaned. Fillets are quick-frozen and packed for storage in the hold within 2 hours of the time they are caught. Livers are cooked and extracted. Refuse and inedible fish are cooked to extract oils and fats, and the remainder is crushed, dried, and bagged as fertilizer. The fish processing machine is in a balanced position in the ship relative to the propulsion machinery so that the ship always rides on an even keel regardless of the weight of the load in the cargo space.

B. J. A.

(3376) U. S. 2,414,061, Jan. 7, 1947, W. E. Richard and J. H. Dennedy (to Seeger-Sunbeam Corp.), Home Freezer Cabinet. - A chest-type cabinet with outer door or lid and inner lids for separate chambers. Gaskets on both outer and inner covers.

R. A. 2, 208 (1947).

(3377) U. S. 2,418,745, April 8, 1947, L. H. Bartlett (to Texas Research Corp.), Quick Freezing of Foodstuffs. - The process of quick freezing food articles which consists in bringing the articles into direct contact with a metastable polyphase refrigerating medium containing a sugary freezing point lowering solute and finely divided particles of the solid phase of the solvent, separating from the articles the major portion of the adhering solution, and refrigerating the medium to remove the heat taken up by the medium during the quick freezing of the articles at such rate as to form further finely divided particles of the solid phase of the solvent.

Off. Gaz. 597, 265 (1947).

(3378) U. S. 2,418,746, April 8, 1947, L. H. Bartlett, W. R. Woolrich, and H. E. Brown (to Texas Research Corp.), Food Freezing Machine. - In a quick freezing medium of the type employing a heat transfer medium in contact with the articles to be frozen, a member having therein a passageway, means for chilling the surface of the passageway below the initial freezing point of the heat transfer medium, an agitator for freeing the wall of the passageway from adhering frozen particles and for moving the heat transfer medium and the refrigerated articles through the passageway, and power means for

imparting to the agitator an irregular motion, including a constant series of short forward movements alternating with periods of dwell, whereby the partioles are advanced in a series of impulses.

Off. Gaz. 597, 265 (1947).

(3379) U. S. 2,419,380, April 22, 1947, M. Van Etten (to Salem Engineering Co.), Freezing of Foods. - Apparatus for the quick freezing of foods comprising in combination a freezing chamber and means to circulate therein a chilled quantity of air, an endless conveyor in said chamber having a loop extending outside said chamber for moving and supporting a plurality of tray-supporting racks each adapted to support a multiplicity of food-carrying trays, a pair of adjacent openings in a wall of said chamber through which the conveyor passes and which permits egress and ingress of said racks whereby at least one of said racks may be moved to a loading position outside said chamber during a period of movement of said conveyor, and means to automatically seal said openings against ingress or egress of air when said one of said racks is in said loading position.

Off. Gaz. 597, 543-44 (1947).

(3380) U. S. 2,419,877, April 29, 1947, C. Birdseye (to Dehydration, Inc.), Process of Improving and Preserving Food Products. - The process of preserving and improving moisture-containing food products, which includes the steps of first dehydrating the product to remove a substantial fraction of its original moisture content, then immersing the partially dehydrated product in a liquid refrigerant containing a flavoring ingredient thereby freezing the product with an accretion of moisture content and flavoring ingredient and in substantially the natural shape of the fresh product.

Off. Gaz. 597, 743 (1947).

(3381) U. S. 2,420,615, May 13, 1947, E. Palmer and D. R. Roberts (to Harry Sach, and E. Palmer, copartners trading as Moorehead Mfg. Co.), Concentrated Coffee Extract. - A closed extraction system is used. A cold extraction of the freshly roasted and ground coffee bean and a concentrate of a hot H_2O extraction of the same bean are combined and quick frozen.

C. A. 41, 4872 (1947).

(3382) U. S. Des. 143,140, Dec. 11, 1945, W. S. Connell (to Bastian-Blessing Co.), Design for a Frozen Food Cabinet. - An upright cabinet having a front door and below it a smaller door at one side and apparently the unit compartment at the opposite side.

R. A. 1, 121 (1946).

(3383) U. S. Des. 145,136, July 2, 1946, C. F. Hoffman (to C. V. Hill & Co., Inc.), Design For a Self-service Frosted Food Fixture. - An open-top frozen food cabinet with glass front.

R. A. 2, 52 (1947).

(3384) U. S. Des. 146,369, Feb. 18, 1947, A. T. Millott, Design for a Frozen Food Merchandising Unit. - Cabinet comprises 4 horizontally extending radial sections spaced 90^0 apart around a central portion. Each section has a top-opening cover.

R. A. 2, 214 (1947).

Index

Agar,
___, freezing of, 2851

Alfalfa,
___, blanching of, 3326
___, frozen, 2431
___, ___, vitamin A in, 3326

Analyses of foods, see Foods, frozen, analyses of

Animals,
___, tissues of,
___, ___, freezing of, see Freezing, effect on animal tissues

Apparatus, see Equipment

Apple cider,
___, freezing of, 2414

Apple juice,
___, prevention of darkening, 3228

Apples,
___, blanching of, 2332, 2380, 3190
___, darkening of,
___, ___, prevention of, 2820, 2840, 3190, 3228
___, ___, ___, test for adequacy of, 2399
___, freezing of, 2380, 3140, 3193
___, ___, preparation for, 2332, 2399, 2530, 2581, 2582, 2996
___, ___, varietal suitability for, 3209
___, frozen, 2255, 2896, 3295
___, ___, fluorescence of, 2928
___, ___, quality of, 2158, 2735, 2996
___, ___, standards for, 3284
___, ___, texture of,
___, ___, ___, maintained by treatment with calcium salts, 2581, 2582, 2996
___, ___, use of, 2996
___, production areas for, 2122
___, vitamin C in, 2399

Apricots,
___, blanching of, 2149, 2703, 3190
___, discoloration of, 2149, 2703
___, ___, retarding and preventing, 3097, 3190, 3257
___, freezing of, 3140
___, ___, methods for, 2144, 2747
___, ___, preparation for, 2703, 3114
___, ___, ___, addition of vitamin C, 2144, 2703, 3257
___, ___, varietal suitability for, 2707, 3209
___, frozen, 2255, 2327, 2340, 2874
___, ___, nectar, 2527
___, ___, quality of, 2735, 3192
___, ___, storage of, 3185
___, production areas for, 2122
___, storage of, 2470

Army,
___, use of frozen foods by, 2120, 2178, 2367, 2396, 2409, 2566, 2612,

Army, use of frozen foods by, (Continued)
____, ____, 2653, 2654, 2776, 2812, 2926

A

Ascorbic acid, see Vitamin C

Asparagus, 2244
____, blanching of, 2244, 2394, 3297
____, ____, tests for adequacy of, 3287
____, freezing of, 2160, 2244, 2301, 2337, 2518, 3247
____, frozen, 2327, 2340
____, ____, quality of, 3287
____, ____, ____, effect of enzymes on flavor, 2158
____, ____, ____, effect of storage on, 2545, 3297
____, ____, storage of, 2545, 3185, 3297
____, transportation of, prior to freezing, 2244

Avocados,
____, freezing of,
____, ____, preparation for, 3114

Baby foods, see Vegetables, frozen purees, and Fruits, frozen, pulps and purees

Bacteria, General,
___, as related to food preservation, 3070
___, causing food poisoning,
___, ___, Botulism, see Bacteria, Specific, Cl. botulinum
___, ___, enterotoxic micrococci, see Bacteria, Specific, Micrococci, enterotoxin producing
___, controlled by germicides, 2945, 3229
___, effect of freezing on, 3070, 3138, 3245, 3274
___, effect of radiation on, 2945, 2961, 2962
___, effect of sugar syrups on, 2962
___, effect of temperature on, see also Bacteria, General, effect of freezing on, 3245, 3271
___, ___, in alternate freezing and thawing, 2730, 3155, 3244
___, heat resistant, 3147
___, in fats,
___, ___, frozen or cold stored, 2718
___, in frozen cooked foods, 2257, 2367, 2614, 2719, 3006
___, in frozen fish, see Fish, frozen, bacteria in
___, in frozen foods,
___, ___, as affecting quality, 2590, 3115
___, ___, growth of, 2412, 2413, 2731, 2733
___, ___, ___, after thawing, 2367, 2483, 2719, 2730
___, ___, ___, conditions for, see also Bacteria, General in frozen foods, growth of, effect of time and temperature on, 2836, 2939, 3155, 3245
___, ___, ___, effect of method of preparing on, 2968
___, ___, ___, effect of time and temperature on, see also Bacteria, General, in frozen foods, growth of, conditions for, 3148, 3155, 3244, 3245, 3272, 3274
___, ___, precooked, see Bacteria, General, in frozen cooked foods
___, in frozen fruit juices, 2414, 2836
___, in frozen fruits and vegetables, 2415, 2736, 2809
___, ___, after thawing, 2367, 2730
___, ___, blanching as affecting, 2544, 2736, 3217
___, ___, in storage, 2367, 2414, 2590, 3155
___, ___, proper washing as affecting, 2736, 3217, 3218
___, in frozen meats, 2731, 2739
___, in frozen peas, 2143
___, in meats, 2731
___, in milk, 2718, 2925
___, in seafoods, 3138
___, in storage, 2416, 2733
___, ___, effect of temperature on survival, 2367, 3138, 3147, 3155, 3245, 3274
___, methods of analysis for, 2182, 2367, 2616, 3070
___, pathogenic,
___, ___, causing food poisoning, 2730
___, ___, ___, survival in frozen foods, 2730, 2736
___, ___, effect of freezing on, 2730, 2733, 3217, 3245
___, problem in freezing plants, 2616, 2754, 3217, 3218
___, sanitary control of, see also Sanitation, 2616, 3217, 3218
___, survival in frozen foods, see also Bacteria, General, effect of freezing on, 2730, 2754, 2836
___, ___, ___, protective action of fats, salts, and sugars on, 3229, 3245
___, toxins of,

Bacteria, General, toxins of, (Continued)
____, ____ , formation in frozen foods, 2730
____, ____, ____, after thawing, 2367, 2730

B

Bacteria, Specific,
____, Clostridium botulinum, 2420
____, ____, effect of freezing on, 2730, 3155
____, ____, in frozen foods, 2420
____, ____, ____, spores of, 2730
____, ____, ____, toxin of,
____, ____, ____, ____, effect of pH on, 2730, 3155
____, Coli-Aerogenes group of organisms,
____, ____, as index to sanitation, 2613, 2736, 2754, 3217, 3218
____, ____, at freezing temperatures, 2616, 2733, 2754, 3115, 3244
____, ____, tests for, 3070, 3155
____, "Colon" organisms, see Coli-Aerogenes group of organisms
____, E. coliform, 2616, 2733, 2836, 3070, 3244
____, Micrococcus,
____, ____, enterotoxin producing,
____, ____, ____, isolated from frozen vegetables, 2736
____, Micrococcus sp.,
____, ____, effect of freezing on, 2736, 3116
____, Pseudomonas sp.,
____, ____, at freezing temperatures, 2733
____, Salmonella, 3115
____, Streptococcus
____, ____, in frozen foods, 3115

Baked products, see also specific items, 2246
____, freezing of, 2640
____, frozen, 2136, 2323, 2449, 2482, 2496, 2499, 2504, 2600, 2601, 2633, 2794, 2795, 2948, 3100, 3149, 3150, 3179, 3270
____, ____, preparation of, 2554
____, ____, quality of, 2724, 2894
____, ____, storage life of, 2136, 2480, 2486, 2640
____, ____, unbaked, 2246, 2270, 2445, 2499, 2640
____, ____, use of frozen eggs in, 2800, 2894, 3278
____, ____, use of frozen fruits in, see also Pies, fruit, frozen, 2246, 2426, 2482, 2486, 2499, 2724, 2735, 2752, 2937, 3295

Bananas,
____, freezing of, 2252
____, ____, preparation for, 3114

Beans, see also Lima beans and Soybeans, 2577
____, baked, 2577
____, blanching of, 2934, 3131, 3297
____, ____, effect on vitamins, 3215
____, ____, tests for adequacy of, 3289
____, brine-packed,
____, ____, compared with straight-packed, 3289
____, freezing of, 2159, 2160, 2301, 2518, 2774, 2931, 2934, 2936, 2993
____, ____, varietal suitability for, 3162, 3184, 3215
____, frozen, 2776
____, ____, quality of, 2158, 2545, 3289, 3297
____, ____, storage of, 3185
____, ____, vitamins in, 2401, 2443, 2444, 2566, 2993
____, vitamin A in, 2838
____, vitamin C in, 2838, 3215

Bearberries, see also Cranberries,
____, freezing of, 3320

Beef,
____, aging of, 2210, 2265, 2436
____, freezing of, 2210, 2265, 2490, 2740, 3058
____, ____, economic importance of, 2271, 2272, 3137
____, frozen, 2371, 3016
____, ____, autolysis of, 2692, 3092
____, ____, boneless, 2612, 3338
____, ____, causes of rancidity in, 2436
____, ____, chip steaks, 2318
____, ____, cooking of, 3117
____, ____, digestibility of, 2725
____, ____, juices,
____, ____, ____, quantity and quality of, 3031
____, ____, palatability of, 2210, 2265, 2436, 2827, 3092
____, ____, quality of, 2436, 2827, 3092
____, ____, ____, effect of freezing rate on, 2435, 2740
____, ____, standards for, 2265
____, ____, storage of, 2263, 2264, 2265, 2436, 3013, 3092, 3185
____, ____, tenderness of, 2210, 2265, 2898
____, ____, ____, effect of freezing temperatures on, 2264, 2692, 2694, 2695
____, ____, thawing of, 2210, 2266, 2694, 2695
____, ____, transportation of, 2299, 3137

Beef stew,
____, frozen, 2257, 2653

Beets,
____, blanching of, 3131

Benzoic acid treatment,
____, of foods for freezing, 2524

Berries, see also specific berries,
____, freezing of, 2497, 2826
____, ____, frozen pack, 2250, 2766
____, ____, immersion,
____, ____, ____, in white mineral oil, 3339
____, ____, preparation for, 2766, 2959, 3114
____, ____, varietal suitability for, 2497, 3320
____, frozen, 2356
____, ____, bacteria, molds, and yeasts in, see chiefly Bacteria, General, 2736
____, ____, chemical changes in freezing and thawing of, 2545
____, ____, for preserve-making, 2603
____, ____, quality of,
____, ____, ____, preservation of color, flavor, odor, etc., 2629, 3088, 3089, 3090, 3298
____, ____, ____, preserved with sugar syrup, 2250, 2501, 2766, 2903
____, ____, sampling of, 2903
____, ____, storage of, 3185, 3298
____, ____, thawing of, see Thawing, of fruits and berries
____, ____, vitamins in,
____, ____, ____, vitamin A, 3089
____, ____, ____, vitamin C, 3088, 3089, 3090
____, ____, ____, ____, effect of varietal variation on, 3088, 3089

Berries, (Continued)
____, production of, 2122

Bibliographies,
____, on food investigation, 2634
____, on food preservation, 2282, 2634, 2762
____, on frozen foods, 2282
____, ____, microbiology of, 2997
____, on milk, 2877

Birdseye processes, 2206, 2207, 2411, 2542, 2883, 2922, 2949, 2978, 2979, 2980, 2981

Blackberries,
____, freezing of, 2250
____, ____, preparation for, 3114
____, frozen,
____, ____, quality of, 2250, 3192
____, ____, sampling of, 2903
____, ____, storage of, 3298

Blanching, see also types of foods and under specific items, 2135, 2283, 2394, 2718, 2758, 2819, 2839, 2845, 2975, 2978, 3097, 3292, 3293
____, air-cooling after, 2528, 2530, 2533, 2703, 3197, 3199, 3287
____, compared with SO_2 treatment, 2530
____, ____, effect on enzymes, 2704
____, ____, effect on vitamin C, 2751
____, effect on bacteria, see Bacteria, General, in frozen fruits and vegetables, blanching as affecting
____, effect on color, 3286, 3288, 3289, 3290, 3291, 3297
____, effect on enzymes, 2281, 2394, 2736, 2885
____, ____, inactivation of, 2384, 2526, 2531, 2533, 2702, 2775, 3286, 3289, 3290, 3291
____, effect on flavor, 2394, 3020, 3286, 3287, 3288, 3289, 3290, 3291
____, effect on microbial content, 3217
____, effect on vitamins, 2161, 2394, 2523, 2751, 2775, 2802, 2838, 2850, 3091, 3215, 3277, 3286, 3326
____, methods of, 2500, 2791, 2974
____, ____, by calcium chloride solution, 2582, 2751
____, ____, by hot damp air, 3332
____, ____, comparison of water and steam for, 2394, 2469, 2703, 2751, 2762, 2775, 2879, 2916, 2919, 2979, 3091, 3223, 3286, 3287, 3288, 3289, 3290, 3291, 3297
____, electronic, 2161, 2184, 2348, 2751, 2916, 2917, 2919, 3287, 3297
____, ____, with ether vapor, 2758
____, miscellaneous patents on, 3332, 3362, 3368
____, physical changes during, 2387, 2528, 2751, 2762, 2934, 3020, 3223, 3289
____, relation of to subsequent storage, 3286, 3287, 3288, 3289, 3290, 3291, 3297
____, tests for adequacy of, 2158, 2281, 2762, 3091, 3286, 3287, 3288, 3297
____, water-cooling after, 2528, 2530, 2533, 2751, 2791, 3197, 3217, 3287

Blueberries,
____, freezing of, 3183
____, ____, varietal suitability for, 2501, 2766, 3320
____, frozen, 2205, 2255, 2937

Blueberries, frozen, (Continued)
___, ___, effect of blanching on, 2501
___, ___, quality of, 2735
___, ___, ___, effect of preparation for freezing on, 2766, 3090, 3192
___, ___, ___, preserved with sugar syrup, 2766
___, ___, vitamins in, 3090

Bluepoints Company, 2116

Botulism, see Bacteria, Specific, Cl. botulinum, and toxic substances in frozen foods

Boysenberries,
___, frozen, 3192

Brandy,
___, made from frozen fruits, 2641

Bread, see also Baked Products,
___, frozen, 2480, 2482, 2687, 3149

Brine, see Refrigerants, brines, and Freezing, immersion, in brine

Broccoli, 2254
___, blanching of, 2394
___, freezing of, 2254, 2284, 2337, 2931, 3140
___, ___, varietal suitability for, 3162
___, frozen, 2254, 2653
___, ___, cooking of, 2738
___, transportation of, prior to freezing, 2254
___, vitamins B_1 and B_2 in, 2738
___, vitamin C in, 2394, 2738, 2785

Brunswick stew,
___, frozen, 3084

Brussels sprouts,
___, freezing of, 2931
___, frozen, 3140

Cabbage,
___, blanching of, 2919, 3223
___, ___, loss of vitamin C in, 2161, 3277
___, frozen,
___, ___, nutritive elements in, 2158, 2567
___, ___, vitamin A in, 2599
___, ___, vitamin C in, 2566, 2785

Cabinets,
___, freezing, see also Equipment; Farm freezers; etc., 2180, 2260, 2267, 2321, 2329, 2376, 2411, 2418, 2425, 2522, 2636, 2678, 2690, 2727, 2781, 2818, 2833, 2902, 2914, 3060, 3107, 3130, 3154, 3189, 3219, 3222, 3311, 3342, 3347, 3348, 3349, 3350, 3367, 3371, 3376, 3382, 3383

Cakes, see also Baked products,
___, freezing of, 2640
___, frozen, 2445, 2482, 3149
___, ___, storage life of, 2640, 2894

Cal-Grove Products Co., 2195

Canapes,
___, frozen, 3133

Cantaloupes,
___, freezing of,
___, ___, preparation for, 3114

Carbohydrates, see Freezing, effect on carbohydrates, and Vegetables, carbohydrate content of

Carbon dioxide, see also Refrigerants, carbon dioxide
___, atmosphere,
___, ___, in storage, 2470, 2760, 3159, 3160
___, ___, ___, of meat, 2739

Carotene, see Vitamin A

Carotenoids,
___, in frozen foods, 3205
___, ___, factors affecting, 3204

Carrots,
___, blanching of, 2802, 3131, 3223, 3277, 3297
___, freezing of, 2931
___, ___, varietal suitability for, 3162
___, frozen,
___, ___, nutritious elements in, 2158, 2802, 3297
___, ___, vitamin A in, 2991
___, storage of, 2470

Catalase test,
___, for adequacy of blanching, 2158, 3286, 3287

Cauliflower,
___, blanching of, 2751
___, freezing of, 2931, 3140
___, ___, varietal suitability for, 3162, 3184

Cauliflower, (Continued)
___, frozen, 2653
___, ___, vitamin C in, 2751

Cedargreen Company, 2132

Celery,
___, freezing of, 3184

Chard, see Swiss chard

Cheeses, 2860
___, freezing point of, 3240
___, frozen, 2396, 2826

Chemistry of foods, 2621, 3054
___, alcohol-insoluble constituents,
___, ___, as index to quality, 2797, 2802
___, colloidal aspects, 2378, 2687
___, fluorescence, 2928, 3023
___, frozen and stored, 2377, 2378, 2470, 2480, 2545, 2790, 2806, 3013, 3098
___, research on, 2687, 2762

Cherries,
___, blanching of, 3228
___, freezing of, 3140
___, ___, methods for, 3327
___, ___, preparation for, 2122, 2959, 3018, 3039, 3114
___, frozen, 2287, 2327, 2340, 2683, 2937
___, ___, quality of, 2735
___, ___, standards for, 2287, 3039

Chili, green,
___, freezing of, 2791, 2792

Chow mein,
___, frozen, 2130

Cider, see Apple cider

Citrus fruits and fruit juices, see Fruits, citrus, Fruit juices, citrus, and also specific items

Coconuts, 3131
___, freezing of, 2252

Codes, standards, and laws, see also Locker plants, laws, 2150, 2152, 2153, 2215, 2216, 2947, 3210

Codfish,
___, frozen, 2206, 2497, 2793, 2859

Coffee,
___, deterioration in flavor of, 2361
___, frozen,
___, ___, concentrated, 2361, 2621, 3370, 3381

Cold pack, see Freezing, frozen pack

Colloidal precipitation, see Freezing, changes in foods during, colloidal changes in

Color,
____, measuring apparati and methods, 3297

Cooking, 2443, 2444, 2701, 2944, 3184
____, of frozen foods, see Foods, frozen, cooking of
____, ____, prior to freezing, see Precooking, of foods, for freezing

Cooperatives, 2571, 2625, 2666, 2853, 2906, 3040, 3237, 3262

Corn, 2247
____, blanching of, 2247, 3297
____, ____, tests for adequacy of, 3290
____, freezing of, 2160, 2247, 2284, 2337, 2775
____, ____, varietal suitability for, 2662, 3162, 3184
____, frozen, 2327, 2340, 2776
____, ____, quality of, 2158, 2545, 3078, 3290, 3297
____, ____, ____, compared with canned, 3297
____, ____, storage of, 3185, 3290
____, ____, thawing of, 2545
____, on-the-cob,
____, ____, blanching of, 3291
____, ____, freezing of, 2099, 2801
____, ____, frozen, 3078
____, quality test for, 2247
____, storage of, 2470, 3078
____, vitamin A in, 3076
____, vitamin B in, 3076
____, vitamin C in, 3076

Costs, see Economics, costs

Crabs, see also Crustaceans, 3308
____, frozen, 2354, 2472, 3308

Cranberries,
____, freezing of, 3183, 3320

Cranberry sauce,
____, freezing of, 2430

Cream, see Milk

Crowberries, see also Cranberries,
____, freezing of, 3320

Crustaceans,
____, freezing of, 2354, 2472, 2573, 2799
____, frozen, 2256, 2605
____, ____, marketing of, 3307, 3308

Crystallization during freezing,
____, effect of rate of freezing on, 2159, 2393, 2694, 2695, 2740, 2813, 2936
____, effect on bacteria, 2754
____, enzyme reactions in, 2885
____, in animal tissues, 2661, 2694, 2695, 2731, 2740, 3261

Crystallization during freezing, (Continued)
____, in plant tissues, 2747
____, minimizing, 2374
____, of fruit and sugar syrups, 2393, 2747, 2810, 2937
____, of proteins, 2506, 2620
____, relation of crystal size to destruction, 2694, 2740, 3329
____, relation to shape of containers, 2813, 3064, 3276
____, studied through freezing of gel, 2395

Cucumbers,
____, freezing of, 2301, 2518

Curds,
____, frozen, 2860

C

Dairy products, see also Milk, Eggs, and Cheese, 2276, 2396
____, bacteria in, 3271
____, frozen, 2269, 2407, 2408, 2463, 2718, 3027, 3168
____, ____, storage of, 2679

D

Dates,
____, freezing of,
____, ____, preparation for, 3114

Defrosting, see Thawing

Dehydrofreezing, 2160, 2387, 2675, 2696, 2713, 2918, 2920, 3043, 3360, 3372, 3380
____, advantages of, 2713, 2918, 2987
____, in New Zealand, 2110
____, of eggs, 2181

Demands, for frozen foods, 2109, 2340, 2495, 2552, 2752
____, abroad, 2351, 3249
____, in hotels, 2193
____, in institutions, 2255, 2327, 2752, 2957, 3099, 3211, 3295
____, in railway dining cars, 2348, 2777, 2778
____, in ship dining halls, 3221, 3250

Desiccation, see also Fish, Fruit; Meat; Poultry; and Vegetables, frozen, desiccation of,
____, factors affecting,
____, ____, reduction of, 2190, 2608
____, ____, ____, by proper packaging, 2648, 2661

Dewberries,
____, freezing of, 2250
____, ____, preparation for, 3114
____, ____, varietal suitability for, 3184, 3320

Dielectric heating, see Electronic heating, of foods

Dilatometer, see Equipment, for freezing, for measuring extent of

Directories, see also specific items,
____, of frozen foods companies, 2168, 2171, 2253, 2254, 2256, 2277, 2315, 2411
____, of manufacturers of freezing equipment, 2240, 2338
____, of manufacturers of prefreezing treatment equipment, 2125, 2338
____, of refrigeration supply houses, etc. 2248, 2315

Discoloration,
____, of fish, see Fish, frozen, discoloration of
____, of fruits and vegetables, see Fruits, discoloration of, and Vegetables, frozen, discoloration of
____, of meats, see Meats, frozen, color of, discoloration of
____, packaging to prevent, see Packaging, to prevent discoloration

Dog food,
____, frozen, 2825

Drip,
____, factors affecting, see Thawing, drip following, and Freezing, effect on animal tissues, drip on thawing

Drip, (Continued)
___, of meats, fish, poultry, see under same, desiccation of, drip in

Ducks, see also Poultry,
___, freezing of, 2333

D

Economics, see also Foods, frozen, industry; Marketing; etc., 2118, 2271, 2272
____, costs, 2944, 3026
____, ____, of distribution, 2184, 2296, 2670, 3044, 3050
____, ____, of freezing, 2387, 2626, 2771, 2773, 2774, 2799, 2830, 2880, 2882, 2922, 3247
____, ____, of frozen foods, 2297, 2320, 2323, 2446, 2447, 2541, 2575, 2614, 2651, 2724, 3050, 3099, 3221, 3252, 3305
____, ____, of packaging, 2223, 2330, 2549, 2550, 3299
____, ____, of plants, 2203, 2625, 3075, 3234, 3262
____, ____, of prefreezing treatment, 3160
____, ____, of storage, 2184, 2203, 2438, 2562, 2669, 3151
____, ____, of transportation, 2184, 2360
____, demands for frozen foods, see Demands, for frozen foods
____, financing of operations, 2137, 2246, 2625, 2895, 3210
____, of freezing, 2344, 2454, 3037
____, ____, frozen pack, see Freezing, frozen pack, economics of
____, ____, margin of profit, 2203, 2561, 2628, 3030
____, statistics, 2118, 2208, 2327, 2340, 2342, 2346, 2349, 2447, 2476, 2495, 2669, 2671

Eggs,
____, freezing of, 2175, 2667, 2687, 2826, 2909, 2949, 2962, 2966
____, ____, preparation for, 2958, 3278, 3300
____, ____, ____, dips for, 2396
____, frozen, 2133, 2481, 2482, 2483, 2484, 2486, 2718, 2737, 2765, 2800, 2894, 2912, 2957, 3019, 3037
____, ____, bacteria in, 2733, 2806, 2939, 2962, 2968, 3069, 3070, 3115, 3147, 3274
____, ____, dried, 2181, 2806, 2949, 2963, 3115
____, ____, fluorescence in, 3023
____, ____, packaging of, 3146
____, ____, quality of, 2962, 2963, 3070, 3115, 3212
____, ____, solids content of,
____, ____, ____, method for determination of, 2797
____, ____, vitamin A in, 2737

Elderberries,
____, freezing of, 3320

Electronic (dielectric) heating, 2348, 2482, 2483, 2484, 2485, 2629, 2863, 3086, 3087, 3117, 3152, 3246, 3312
____, for blanching, see Blanching, methods of, electronic,
____, for thawing, see Thawing, by electronic heat

Enzymes, General,
____, activity of, 2526, 2745
____, ____, at different temperatures, 2681, 2885
____, ____, at low temperatures, 3245
____, ____, control of, 2384, 2791, 2840, 2968, 3187, 3190, 3286, 3288, 3289, 3290, 3297
____, ____, ____, by electronic heating, see chiefly Thawing, by electronic heat, 3208, 3287
____, ____, ____, in corn-on-the-cob, 3291
____, causing deterioration,
____, ____, in fats, 3242
____, ____, in frozen fish and seafoods,
____, ____, ____, during storage, 2386, 2681, 3158, 3159, 3160
____, effect of sugar syrups on, 3061

Enzymes, General, (Continued)
____, effect of vitamin C on, 2366
____, effect on crystallization, 2885
____, effect on frozen foods, 2420, 2753
____, ____, color and odor altered by, 2366, 2484, 3061, 3242
____, ____, flavor altered by, 2484, 3000, 3061
____, effect on vitamins, 2751
____, for flavor development, 2759, 2760
____, oxidative,
____, ____, changes caused by, 2366
____, ____, ____, in flavor, 3158, 3242
____, ____, ____, ____, prevention of, 2386, 2840
____, ____, effect of blanching on, 2919
____, ____, fruit discoloration by,
____, ____, ____, prevention of, 2200, 2366
____, relation to food preservation, 2681, 2885

Enzymes, Specific,
____, catalase, 2158, 2745, 2751, 2919
____, cytochrome-haemoglobin, 2386
____, hydrogenase, 2775
____, oxidase, 2526, 2531, 2533, 2840
____, ____, ascorbic acid test for, 2158
____, pectinase, 2396
____, peroxidase, 2281, 2384, 2526, 2531, 2533, 2745, 3054, 3091, 3158, 3159, 3160
____, proteolytic,
____, ____, effect of temperature on, 2885

Equipment, 2629, 2749, 2782, 2904
____, blanching, 2283, 2974, 2978, 3131, 3194, 3362, 3368
____, cabinets, see Cabinets
____, cooking, 3131, 3246
____, directories of producers, see Directories
____, display, 2329
____, ____, cases, 2184, 2781, 2955, 3351, 3352
____, ____, ____, automatic, 2186, 2330, 2781, 2955, 3136, 3352, 3356, 3383, 3384
____, farm freezers, see Farm freezers
____, for filleting, 2305, 2331, 2410, 2763, 3038, 3375
____, for freezing, see also Plants, commercial, 2230, 2411, 2425, 2510, 2667, 2675, 2763, 2783, 2813, 2821, 2964, 2975, 2977, 3003, 3309, 3331
____, ____, air blast, 2608, 2774, 2798, 2893, 2978
____, ____, ____, truck and tray, 2126, 2771, 2773, 2774, 2975, 3117
____, ____, ____, tunnel, 2261, 2774, 2966, 2977, 3119
____, ____, experimental, 2228, 2477, 2608, 2697, 2762, 2982, 2985, 3053, 3103, 3258
____, ____, for measuring extent of, 2506, 2620
____, ____, immersion, 2610
____, ____, ____, in spray or fog, 2893
____, ____, ____, polyphase, 2392
____, ____, in cans, 3039
____, ____, indirect contact,
____, ____, ____, multiplate, 2386, 2893
____, ____, miscellaneous patents on, 2329, 3347, 3350, 3357, 3358, 3361, 3363, 3365, 3366, 3367, 3368, 3369, 3375, 3377, 3378, 3379
____, ____, of fish, see Fish, freezing of, equipment for
____, ____, portable, 2185, 2228, 2233, 2360, 2512, 2612, 2644

Equipment, for freezing, (Continued)
____, ____, shaker type, 2132, 2771, 2773
____, for locker plants, see Locker plants, equipment for
____, for marketing, see Equipment, display
____, for processing, see also Blanching; Prefreezing treatment, equipment for, 2310, 2333
____, for refrigeration, see Refrigeration, equipment
____, for storage, see Storage, of frozen foods, equipment for
____, for transportation, see Transportation, of frozen foods, equipment for
____, Home freezers, see Home freezing and Cabinets
____, requirements, 2341

Farm freezers and freezing, see also Cabinets, Home freezers, and Locker plants, 2321, 2365, 2507, 2588, 2636, 2815, 2858, 2902, 2946, 3026, 3142, 3273, 3275
___, details of, 2180, 2375, 2376, 2425, 2512, 2690, 2749, 2818, 2830, 2872, 3018, 3060, 3141, 3189, 3213

Fats and oils, 2312
___, effect of bacteria, molds, and yeasts on, 2718
___, effect of seasonings on, 2567
___, ___, during freezing storage, 2640
___, emulsions of, 3067
___, ___, stability of, 2312, 2407, 2408, 2721, 3072, 3206, 3285
___, for coating flesh products, see Freezing, coating products prior to and after
___, freezing of, 2312, 3339
___, ___, effect of thawing on, 2312, 2407
___, ___, effect on, 2312, 2719, 2951, 3092
___, of frozen beef, 3013, 3092
___, of frozen fish, 2386, 2790
___, ___, causes of discoloration, 2677, 3158, 3159, 3160
___, of frozen fruit juices, 3355
___, of frozen fruits, 2680
___, of frozen lamb, 3013
___, of frozen meats, 2312, 3013
___, ___, quality tests for, 3092
___, ___, storage of, 2822, 3092
___, ___, ___, factors causing unfavorable changes in, 3013
___, of frozen pork, 2935, 3013, 3242, 3260
___, of frozen poultry,
___, ___, oxidation of, 3222
___, ___, stability of, 3072, 3225, 3226, 3227
___, oxidation of, 2386, 2396, 3160
___, rancidity of, 3158, 3159, 3160, 3179, 3242, 3260
___, synthetic, 2396

Figs, 2704
___, freezing of, 3140
___, ___, preparation for, 3020, 3328
___, ___, varietal suitability for, 2704, 3209
___, frozen, 3020

Fish, see also Sea foods and specific items, 3308
___, chemical composition of, 2805
___, effect of cold and freezing storage on, 3093, 3158, 3159, 3160
___, freezing of, 2112, 2140, 2155, 2156, 2175, 2205, 2209, 2227, 2249, 2252, 2305, 2337, 2453, 2620, 2779, 3317
___, ___, at sea, 2206, 2231, 2232, 2354, 2472, 2849, 2922, 3375
___, ___, effect of,
___, ___, ___, on breakdown in cell structure, see also Freezing, effect on animal tissues, 3093, 3098, 3329
___, ___, effect of prior cold storage on, 3098
___, ___, equipment for, see also various processes, 2331, 2843, 2922
___, ___, glazing prior to, see Freezing, coating foods prior to and after
___, ___, in Alaska, 3319
___, ___, in Canada, 2205, 3318
___, ___, in Iceland, 2300, 3038
___, ___, in Norway, 2206, 2354, 2410, 2922

F

Fish, freezing of, (Continued)
____, ____, methods for, 2763, 2805
____, ____, ____, air blast, 2922, 3318
____, ____, ____, immersion,
____, ____, ____, ____, in brine, 2331, 2922, 3038, 3329
____, ____, ____, ____, in spray or fog, 2922, 3316
____, ____, ____, indirect contact, 2922, 3038, 3318
____, ____, miscellaneous patents on, 3329, 3374
____, ____, plants for, see also Fish, freezing of, at sea, 2410, 2763, 2843, 2922, 3318
____, ____, pretreatment for, see also Freezing, coating foods prior to and after, 2249, 2386, 2922, 3128
____, frozen, 2133, 2280, 2300, 2485, 2516, 2600, 2954, 3306, 3313
____, ____, analyses of, see also Foods, frozen, analyses of, 3098, 3157, 3158, 3159, 3160
____, ____, bacteria in, 3138, 3158, 3159, 3160
____, ____, ____, prevention of growth, 3138
____, ____, ____, production of red coloration, 3138
____, ____, cooking of, 2859
____, ____, desiccation of, 3309
____, ____, ____, coatings for preventing shrinkage in, see Freezing, coating foods prior to and after
____, ____, ____, drip on thawing of, 3093, 3157
____, ____, ____, ____, prevention of by brining, 3156
____, ____, discoloration of,
____, ____, ____, from oxidation of fats, 2677
____, ____, effect of storage on, 2155, 2385, 2386, 2859, 3093, 3098
____, ____, ____, autolysis, 2677, 3159, 3160
____, ____, glazing of, see Freezing, coating foods prior to and after
____, ____, marketing of, see Marketing, of frozen foods, 2331, 2487, 3304, 3305, 3308
____, ____, oxidation of,
____, ____, ____, prevention of, 3158
____, ____, packaging of 2211, 2305, 2310, 2410, 2677, 3160
____, ____, processing plants for, 2207, 2209, 2410
____, ____, ____, sanitary measures in, 3159
____, ____, quality of, 2331
____, ____, ____, factors affecting, 2305
____, ____, smoked, 2536, 2769, 2922
____, ____, storage of, 2280, 2385, 2386, 2410, 2472, 2536, 2679, 3098, 3156, 3185
____, ____, ____, effect of enzymes during, see Enzymes, General, causing deterioration, in frozen fish and seafoods
____, ____, swelling of,
____, ____, ____, effect of pH on, 3157
____, ____, thawing of, see Thawing, of fish
____, ____, transportation of, 3310
____, protein in, 2536, 2620, 2922
____, spoilage of, 2386, 3158
____, vitamins in, 2769

Flavor, see subheading "flavor of" under specific foods
____, off-flavors, see also subheadings "off-flavors", "taint", etc., under various foods, 2679, 2698, 2753, 2755, 3111, 3112, 3159, 3160
____, retention in foods, see also subheading of "flavor" under various foods, 2640, 3088, 3089, 3090, 3092, 3191
____, ____, by proper packaging, see Packaging, to protect flavor
____, tasting panels for, see Organoleptic tests

Food technology, 2928, 3191, 3259
___, courses given in, 2154

Foods, see also specific foods and general classes of foods, such as Meats, Fruits, Vegetables, etc.,
___, chemical composition of, see Chemistry of foods, and pertinent subject headings under specific foods
___, cooked,
___, ___, frozen, see Precooking, of foods, for freezing
___, frozen, see also under types of foods and under specific items, 2193, 2273, 2306, 2412, 2413, 2452, 2520, 2622, 2656, 2672, 2691, 2705, 2722, 2777, 2778, 2819, 2831, 2921, 2923, 2924, 2929, 2960, 2988, 3036, 3303
___, ___, analyses of, see also Chemistry of foods; Organoleptic tests; and Histological techniques, 2396, 2566, 2762, 2928, 2976, 3088, 3089, 3090, 3091
___, ___, ___, for bacteria, see Bacteria, General, methods of analysis for
___, ___, ___, for bound water content, 2545, 2709, 2790, 3088, 3089, 3098
___, ___, ___, for lactose and glucose, 2665
___, ___, ___, in prevention of discoloration, see also Blanching, tests for adequacy of, 2580
___, ___, bacteria in, see Bacteria, General, in frozen foods
___, ___, color of, see Fruits, discoloration of; Enzymes, General, effect on frozen foods, color and odor altered by; and Blanching, effect on color
___, ___, cooking of, 2119, 2120, 2429, 2504, 2808
___, ___, ___, effect on vitamins, 2566
___, ___, ___, methods compared, 3087
___, ___, costs of, see Economics, costs, of frozen foods.
___, ___, desiccation in, see also Fish, frozen, desiccation of; Meats, frozen, desiccation of; and Poultry, frozen, desiccation of,
___, ___, ___, factors affecting, 2608, 2882
___, ___, deterioration of, see also Spoilage, 2753
___, ___, effect of enzymes on, see Enzymes, General, effect on frozen foods
___, ___, exhibitions, 2328
___, ___, factors affecting, 2558, 2559, 2659
___, ___, flavor of, see also subheading "flavor of" under various foods, 2536
___, ___, ___, methods for improving, 2759, 2760
___, ___, fluorescence of, 2928, 2961
___, ___, industry, 2128, 2173, 2208, 2212, 2259, 2262, 2313, 2328, 2334, 2381, 2424, 2427, 2442, 2451, 2454, 2474, 2505, 2556, 2570, 2575, 2576, 2593, 2623, 2624, 2746, 2807, 2828, 2865, 2915, 2999, 3001, 3080, 3081, 3134, 3145, 3163
___, ___, ___, in Russia, 2428, 2687
___, ___, ___, in Scandinavia, 2283, 2903, 2922, 3171
___, ___, ___, in the Netherlands, 3059
___, ___, ___, use of electricity in, 2346, 2504, 2588, 2636, 2881, 2973
___, ___, inspection of, 2302, 2585, 2610, 2615, 2776, 2845
___, ___, lists of, 2242, 2339, 2600
___, ___, marking of, 2884
___, ___, minerals in, 2255
___, ___, ___, effect of freezing on, 2837
___, ___, molds in, see Molds, in frozen foods
___, ___, oxidation of,
___, ___, ___, control of, see Fruits, discoloration of, prevention of,

Foods, frozen, oxidation of, control of, (Continued)
____, ____, ____, ____, by proper packaging, see Packaging, to prevent oxidation
____, ____, packers of, see Packers, frozen food
____, ____, precooked, see Precooking, of foods, for freezing,
____, ____, ____, bacteria in, see Bacteria, General, in frozen cooked foods
____, ____, ____, reheating of, 2241
____, ____, production map of, 2307, 2308, 2670
____, ____, quality of, see also "quality of" under specific foods, 2267, 2298, 2302, 2396, 2536, 2545, 2552, 2555, 2627, 2628, 2718, 2728, 2746, 2753, 2867, 2952, 2961, 3188
____, ____, research, 2557, 2559, 2570, 2659, 2673, 2687, 2694, 2712, 2721, 2748, 2762, 2841, 2890, 2936, 2964, 2978, 3000, 3005, 3031, 3103, 3259,
____, ____, spoilage of, see Spoilage, of frozen foods
____, ____, standards for, see also under types of food and under specific items, 2298, 2358, 2559, 2615, 2728, 2899, 3188
____, ____, storage of, see Storage, of frozen foods
____, ____, SO_2 pretreatment of, see SO_2 treatment, of foods for freezing
____, ____, thawing of, see Thawing
____, ____, thermodynamics of, see Thermodynamics, of frozen foods
____, ____, vitamins in, 2569, 2837, 2879
____, ____, ____, effect of blanching on, see Vitamins, in frozen foods, effect of blanching on
____, ____, ____, effect of cooking methods on, see Vitamins, in frozen foods, effect of cooking methods on
____, ____, ____, effect of freezing on, see Freezing, effect on vitamins
____, ____, yeasts in, see Yeasts, in frozen foods
____, nutritive constituents of, see Meats, frozen, composition of; Vitamins; etc.
____, ____, effects of freezing on, 2837, 2951
____, ____, retention of,
____, ____, ____, during preservation, 2567, 3180
____, poisoning from,
____, ____, Cl. botulinum causing, see Bacteria, Specific, Cl. botulinum
____, preparation for freezing, see Prefreezing treatment
____, ____, growth of bacteria in, see Bacteria, General, in frozen foods, growth of, effect of method of preparing on
____, preservation of, 2397, 2489, 2826, 2845
____, ____, methods compared, 2396, 2741
____, satisfactory for freezing, 2662
____, ____, quality of, 2558
____, surplus, 3047
____, ____, marketing of, 2137, 2369, 2864
____, thermodynamics of, see Thermodynamics
____, vitamins in, see Vitamins

Freezer burn, 2265
____, causes of, 3013
____, elimination of, 2333, 2689
____, ____, by coatings of fat or ice, see also Freezing, coating foods prior to and after, 2310
____, ____, by control of humidity, 2354
____, ____, by proper packaging, 2223, 2910, 2962, 2969, 3299, 3323

Freezing, see also types of foods, specific items, Equipment, and names of individual processes, 2102, 2119, 2192, 2379, 2395, 2400, 2409, 2621, 2626, 2638, 2657, 2696, 2721, 2748, 2771, 2772, 2879, 2880,

Freezing, (Continued), 2945, 3002, 3269
___, air blast, see also under Equipment, 2100, 2156, 2227, 2386, 2421, 2472, 2518, 2650, 2708, 2798, 2843, 2882, 2893, 2900, 2922, 2930, 2931, 2934, 2978, 2980, 2992
___, ___, combined with refrigerated surface contact, 2323
___, ___, effect of air velocity on, 2608, 2771, 2772, 2773, 2931, 2934, 2983
___, ___, truck and tray, see also Equipment, 2174, 2301, 2771, 2773, 2774, 2975, 3117, 3379
___, ___, tunnel, see also Equipment, 2164, 2174, 2234, 2261, 2301, 2332, 2518, 2773, 2966, 2975, 2977, 3117, 3119
___, ___, ___, vertical, 2774, 2900
___, books on, 2489, 2517, 3195, 3201
___, cabinets for, see Cabinets, Farm freezers, and Holding boxes
___, changes in foods during,
___, ___, colloidal changes in, see also Chemistry of foods, colloidal, aspects and Gel, effect of freezing on, 3355
___, coating foods prior to and after, 2310, 2354, 2386, 2678, 2693, 2719, 2771, 2773, 2933, 2949, 3038, 3160, 3328, 3329, 3337, 3339, 3340, 3341, 3353
___, combined with dehydration, see Dehydrofreezing
___, costs of, see Economics, costs, of freezing
___, effect of rate of, 2772, 2930, 2931, 2983
___, ___, on crystallization, see also Crystallization during freezing, 2936
___, ___, on quality, 2723
___, effect of shape of containers, 2813
___, effect on animal tissues, 2692, 2694, 2695, 2698, 2725, 3261, 3329
___, ___, autolysis of, 2731
___, ___, drip on thawing, 2370, 2694, 3261
___, effect on bacteria, see Bacteria, General, effect of freezing on
___, effect on carbohydrates, 2583, 2793
___, effect on enzymes, see Enzymes, General, activity of, at low temperatures
___, effect on fats, see Fats and oils, freezing of, effect on
___, effect on meats, see Freezing, effect on animal tissues and Meats, frozen, color, flavor, etc.
___, effect on plant cells, 2723
___, ___, effect of storage temperature on, 3208
___, ___, micro-physical changes, 3208
___, ___, of liquid air freezing, 2775
___, effect on proteins, see Proteins, effect of freezing on
___, effect on vitamins, 2159, 2523, 2583, 2599, 2631, 2803, 2837, 3215
___, frozen pack, 2250, 2332, 2744
___, ___, comparison of dry-pack and wet-pack methods, 2708, 3173
___, ___, distribution of, 2327
___, ___, economics of, 2327
___, humidity control during, see also Freezing, moisture losses in food during, 2608
___, immersion, see also Equipment, for freezing, immersion, 2880, 3366, 3339
___, ___, agitation during, 2743
___, ___, in brine, 2228, 2743, 2843, 3289
___, ___, in polyphase media, see also Equipment, for freezing, immersion, polyphase, 2392
___, ___, in spray or fog, 2893, 2922, 2949, 2980
___, ___, media for,
___, ___, ___, alcohol brine, 2194
___, ___, ___, alcohols, 2164, 2304, 2352, 2751, 2762, 3247

F

Freezing, immersion, media for, alcohols, (Continued)
____, ____, ____, ____, mono- and multivalent, 3053
____, ____, ____, brine, see also Freezing, immersion, in brine, 2231, 2687
____, ____, ____, liquid air, 2775
____, ____, ____, liquid nitrous oxide, 2100, 2237, 2364, 2396, 2511, 2757, 2835, 2844, 2846, 2880
____, ____, ____, liquid propane, 2237
____, ____, ____, mineral oil, 3339
____, ____, ____, sugar syrup, 2501, 2525, 2529, 2590, 2687, 2799, 3020, 3124, 3327
____, ____, ____, ____, and juice of fruit being frozen, 2399, 3123, 3125
____, in Alaska, 2497, 3319, 3320
____, in British Columbia, 2196
____, in Bulgaria, 2207
____, in cans, see also under Equipment and Packaging, containers, 2189, 2263, 3039, 3049, 3108, 3124
____, in Florida, 2102, 2864
____, in Great Britain, 2518, 2574, 2664, 2739, 2841, 2891, 2892, 2972, 2973, 3000, 3319
____, in individual pieces, 2190
____, in Montana, 2099
____, in Scandinavia, 3171
____, in Scotland, 2156, 2202, 2385, 2386
____, in Switzerland, 2888
____, in the East, 2584, 3009
____, in the Missouri Valley, 2106
____, in the South, 2164, 2593, 3075, 3211
____, in the Southeast, 2096, 2762, 3009, 3071, 3129, 3214, 3266
____, in the West, 2189, 2252, 2273, 2304, 2352, 2673, 2703, 2704, 2705, 2708, 2838, 3073, 3209, 3267
____, indirect contact, 2880
____, ____, Birdseye (miscellaneous), 2542, 2880
____, ____, using flexible metal belts, 3353
____, ____, using floating pans, 3038
____, ____, using refrigerated plates, 2305, 2640, 2930, 2933, 2949, 3330
____, ____, ____, combined with air blast, 2922, 2981
____, ____, ____, multiplate, see also Equipment, for freezing, indirect contact, multiplate, 2386, 2893, 2922
____, into solid blocks, 2301, 2934
____, loose pack, 2608, 2771, 2774, 2799, 2932, 2933, 2936
____, miscellaneous patents on, 3329, 3330, 3333, 3334, 3335, 3336, 3353, 3360, 3361, 3366, 3370, 3371, 3372, 3373, 3374, 3377, 3378, 3379, 3380, 3381
____, moisture losses in food during, see also Freezing, humidity control during, and Meats, Vegetables, Poultry, etc., frozen, desiccation of, 2608
____, on ships, see Fish, freezing of, at sea
____, surveys on, see also Freezing, books on, 2316, 2500, 2523, 2741, 2997, 3180
____, thermodynamics of, see Thermodynamics and Temperature
____, vacuum, 2190, 2204, 2263, 2354, 2387, 2448, 2464, 2524, 2880, 3125, 3372
____, with carbon dioxide, 2229, 2232, 2267
____, with dry ice, see Freezing, with carbon dioxide

Frog legs,
____, frozen, 3307

Frozen Food Foundation, Inc., 2137, 2260

Frozen pack, see Freezing, frozen pack

Fruit juices, see also Juices; Orange juice; Grape juice; Apple juice; Lime juice; Lemon juice; Tangerine juice; and Tomato juice,
___, citrus,
___, ___, freezing of, 2199, 2535
___, ___, ___, concentration by, 2131, 2157, 2353, 2464, 2534, 2637, 2675, 2680, 3121, 3124
___, ___, ___, vacuum, 2464, 2529, 3355
___, ___, frozen, 2222, 2519
___, ___, ___, blends of, 2529
___, ___, ___, concentrated, 2534, 2637, 2680, 3121, 3124
___, ___, ___, ___, reconstitution of, 2131, 2353
___, ___, ___, desiccation of, 3346
___, ___, ___, factors affecting quality of, 2535, 2836
___, ___, ___, storage of, 2131, 2680, 3121, 3124
___, ___, ___, varietal suitability for, 2529
___, ___, ___, vitamin C in, 2195, 3121, 3124
___, ___, pasteurization of, 2529, 2534, 2535, 2680
___, freezing of, see also Fruit juices, citrus, 2160, 3317
___, ___, for concentration, 2396, 2510, 2524, 2712, 2759, 2798, 2975
___, ___, ___, protection of flavor, 2760
___, ___, in cans, 2607
___, frozen, 2133, 2170, 2943
___, ___, bacteria in, see Bacteria, General, in frozen fruit juices
___, ___, blending of, 2527, 2532
___, ___, commercial possibilities of, 2759
___, ___, quality of, 2532
___, homogenization of, 2532, 2759, 2760
___, molds in, see Molds, in fruit juices
___, sterilization of, 2760

Fruit nectars,
___, frozen, 2527

Fruits,
___, blanching of, 2702, 2703, 2704, 2974
___, citrus,
___, ___, freezing of, 2814, 3122, 3123, 3125
___, ___, frozen, 3266
___, ___, ___, vitamin C in, 3122, 3123
___, ___, production of, 2122
___, discoloration of, 2366
___, ___, delaying the onset of see also Fruits, discoloration of, prevention of, 2426
___, ___, due to nonoxidative processes, 2681
___, ___, prevention of, 2484, 2681, 2840
___, ___, ___, by blanching, see also Fruits, blanching of, 2702, 3257
___, ___, ___, by citric acid, 2366, 3061, 3257
___, ___, ___, by $NaHSO_3$ and Na_2SO_3, 2703, 3061
___, ___, ___, by sugar solutions, 2703, 3061, 3257
___, ___, ___, by SO_2 and sulfurous acid, 2702, 2703, 3257
___, ___, ___, by thiourea (thiocarbamide), 3061, 3257
___, ___, ___, by vitamin C, 2366, 2398, 2702, 2817, 3061, 3123, 3257, 3279, 3282
___, freezing of, 2096, 2207, 2274, 2332, 2396, 2439, 2475, 2508, 2563, 2626, 2943, 3094, 3095, 3096; 3101, 3114, 3127, 3176, 3177, 3178, 3183, 3317
___, ___, effect of rate on, 2393, 2747, 2983

Fruits, freezing of, (Continued)
___, ___, effect on cell structure, 2687
___, ___, effect on color, 2511, 2525, 3061
___, ___, effect on flavor, 2511, 3061
___, ___, handling prior to, see Fruits, freezing of, preparation for
___, ___, methods for, 2433, 2713
___, ___, ___, air blast, 2943, 2983
___, ___, ___, frozen pack, 2332, 2399, 2525, 2903, 3020, 3279, 3298
___, ___, ___, immersion, 2304, 3247
___, ___, miscellaneous patents on, 3327, 3339, 3340
___, ___, preparation for, 2122, 2332, 2530, 2581, 2686, 2702, 2703, 2959, 2989, 2996, 3020, 3114, 3183, 3216, 3295, 3302
___, ___, use of air of reduced O_2-content during, 2943
___, ___, use of pectin in fruit syrups, 3192
___, ___, use of pectin-pectinates in, 2396
___, ___, varietal suitability for, 2498, 2686, 2702, 2707, 2761, 2811, 3071, 3184, 3209, 3216, 3295
___, frozen, 2133, 2170, 2255, 2259, 2269, 2273, 2287, 2344, 2349, 2357, 2383, 2485, 2486, 2495, 2752, 3079, 3082
___, ___, bacteria in, see Bacteria, General, in frozen fruits and vegetables
___, ___, flavor of, 2426
___, ___, ___, changes during storing, 2943
___, ___, ___, effect of SO_2 on, 2702
___, ___, minerals in, 2255
___, ___, mixtures of, 2602, 3143
___, ___, molds in, see Molds, in frozen fruits and vegetables
___, ___, packaging of, 2107, 2144
___, ___, pH of, 2525
___, ___, pulps and purees, 2123, 2127, 2335, 2403, 2525, 2641, 2703, 2704, 2707, 2742, 2766, 2810, 2840, 2874, 2959, 3165, 3192, 3279, 3317
___, ___, quality of, 2586, 2755, 3284
___, ___, ___, factors affecting, 2484, 2526, 2702, 3165, 3298
___, ___, sampling of, 2903
___, ___, standards for, 2368, 2586, 2899, 3284
___, ___, storage of, 3183, 3298
___, ___, ___, temperature for, 2943, 3298
___, ___, texture of, 2581, 2629, 3020
___, ___, thawing of, see Thawing, of fruits and berries
___, ___, vitamins in, see also under specific fruits, 2255, 2718
___, ___, ___, vitamin C, 2398, 2959
___, ___, ___, ___, effect of freezing on, 2525, 2810
___, ___, ___, ___, effect of storage on, 2810
___, ___, ___, ___, retention when sugar syrup used, 2810
___, growing of, 2497
___, juices of, see Fruit juices
___, preservation of, 3082
___, production of, 2122, 2302, 2344
___, pulps, see Fruits, frozen, pulps and purees
___, purees, see Fruits, frozen, pulps and purees
___, soft,
___, ___, freezing of, 3281, 3283
___, ___, frozen, 2704
___, storage of, 2135, 2398, 2470
___, ___, effect of humidity in, 3208
___, tropical, see also specific items,
___, ___, freezing of, 2335, 2525, 2704, 2931, 3020
___, ___, ___, preparation for, 3114

Fruits, (Continued)
____, Velva, see Fruits, frozen, pulps and purees

Fungi, see Molds and Yeasts

Fusarium wilt, 2108

Game, wild,
____, frozen, 2448, 2947

Gels,
____, studies in freezing of, 2395, 2430, 2851
____, synaeresis in, 2430

German developments, 2133, 2197, 2396, 2397, 2410, 2411, 2511, 2687, 2712, 2758, 2759, 2760, 2798, 2844, 2846, 2922, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 3333, 3334, 3335, 3336

Gooseberries,
____, freezing of, 3320

Gore process, 3124

Grape juice,
____, freezing of, 2742
____, frozen,
____, ____, vitamins in, 2742

Grapefruit, see also Fruits, citrus,
____, freezing of, 3123
____, frozen,
____, ____, quality of, 3123

Grapefruit juice, see also Fruit juices, citrus,
____, freezing of, 2529
____, frozen, 2131

Grapes,
____, freezing of, 2742
____, ____, preparation for, 2959, 3281, 3283
____, ____, varieties for, 3281, 3283
____, production of, 2122

Green beans, see Beans

Guavas,
____, freezing of, 2525
____, ____, preparation for, 3114
____, ____, varietal selection for, 2525
____, frozen,
____, ____, nectar, 2527

Haddock,
___, frozen, 3138, 3308
___, ___, effect of storage conditions on, 2536

Halibut,
___, frozen, 2497
___, ___, refractive index of, 3093

Handling,
___, of frozen foods, see chiefly Storage, Transportation, and Marketing, 3061

Heckeman process, 2980

Herring, 3308
___, freezing of, 2155, 2156, 2385, 2386
___, ___, effect of size and rate on, 2386
___, frozen, 2453
___, ___, effect of storage conditions on, 2155, 2385, 2386, 2536, 3098, 3159
___, ___, smoked, 2790
___, ___, vitamins in, 2769

Histological techniques,
___, for animal tissues, 2694, 2695, 2731, 2740, 3092, 3139
___, for plant tissues, 2762, 2819

History, 2428, 2595, 3007, 3029, 3073, 3191

Holding boxes, see also Cabinets, Farm freezers, etc.
___, for frozen foods, 2105, 2588, 2606, 2690, 2833, 2901, 3154

Home freezing, see also Cabinets, Farm freezers, etc., 2105, 2175, 2176, 2269, 2284, 2295, 2321, 2365, 2376, 2388, 2391, 2394, 2402, 2425, 2439, 2440, 2441, 2579, 2584, 2598, 2636, 2637, 2750, 2804, 2818, 2858, 3018, 3026, 3046, 3060, 3096, 3141, 3142, 3181, 3182, 3255, 3256, 3296
___, summaries on, 2286, 2424, 2473, 2500, 2508, 2547, 2569, 2597, 2638, 2686, 2875, 3144, 3161, 3213
___, test procedure standards for, 2180, 2267, 2329

Horse-meat,
___, frozen, 2371

Humidity, see Freezing, humidity control during; Storage, humidity in; etc.

Ice cream, see also Milk, 2403, 2718, 3012, 3207
____, freezing of, 2374, 2506, 2521, 2639, 3172
____, ____, syrups used in, 2537, 3337
____, ____, use of frozen fruits in, 2683, 2752, 2874, 3192, 3211, 3281, 3295
____, quality of, 2601, 2665, 3114

Ice formation, see Crystallization during freezing

Immersion freezing, see Freezing, immersion; Equipment, for freezing, immersion; etc.

Insulation, 2258, 2321, 2324, 2465, 2668, 3110, 3120, 3139, 3248, 3342
____, cellular glass board, 2868
____, cork board, 2228, 2868
____, mineral wool board,
____, ____, standards for, 2868
____, silica aerogel, 2950

Iron,
____, availability in foods,
____, ____, effect of freezing on, 2951

Jackstone Roto Freezer, 2233

Jams and jellies,
___, frozen fruits for, 2525, 2603, 2703, 3165, 3211, 3295

Juices, see, in general, Fruit juices, Vegetable juices, and juices of specific foods
___, freezing of, 2532, 2742
___, ___, containers for, 2607
___, ___, methods for,
___, ___, ___, drum, 2712, 2759
___, ___, ___, in cans, 2607
___, frozen, 2532

Juneberries,
___, freezing of, 3320

J

Kale,
____, freezing of,
____, ____, varietal suitability for, 3162
____, frozen, 2709
____, ____, vitamin A in, 2599, 2631, 2709
____, ____, vitamin C in, 2631, 2709

Kapillaer syrups, 2687

Karussel process, 2798, 2981

Kippers,
____, frozen, 2536, 2790

Krause-Linde process, 2411, 2510, 2712, 2759, 2798, 2975, 2979, 2981

Lamb,
____, freezing of, 2370
____, frozen, 3013, 3117
____, ____, thawing of, 2370

Lamb stew,
____, frozen, 2257

Lemon juice, see also Fruit juices, citrus,
____, freezing of, 2529, 2534
____, frozen,
____, ____, quality of, 2534

Lettuce,
____, frozen,
____, ____, vitamin A in, 2599
____, ____, vitamin C in, 2785

Lima beans, 2251
____, blanching of, 2251, 3297
____, ____, tests for adequacy of, 3288
____, freezing of, 2251, 2337, 2931, 3140
____, ____, varietal suitability of, 2801, 3068
____, frozen, 2251, 2776
____, ____, quality of, 3078, 3297
____, ____, ____, factors affecting, 3288
____, vitamin A in, 2838
____, vitamins B_1 and B_2 in, 2401, 2444, 2838
___, vitamin C in, 2401, 2444, 2838, 3078

Lime juice, see also Fruit juices, citrus,
____, frozen, 2131

Liver,
____, fish,
____, ____, uses of, 3375
____, vitamin B in,
____, ____, effect of freezing and thawing on, 2491

Lobsters,
____, frozen, 3307
____, ____, storage of, 3185

Locker plants, see also Refrigerated warehouses and Cooperatives, 2105, 2106, 2148, 2417, 2457, 2466, 2561, 2595, 2887, 2908, 2953, 3007, 3035, 3065, 3103, 3198, 3236
____, air lock chambers in, 2228
____, cold storage, 2139, 2146, 2166, 2203, 2228, 2440, 3234
____, descriptions of, 2141, 2148, 2172, 2475, 2502, 2596, 2644, 2664, 2684, 3021, 3109
____, distribution of, 2106, 2214, 2277, 2285, 2307, 2308, 2362, 2670
____, economics of, 2151, 2455, 2456, 2476
____, equipment for, 2172, 2458, 2502
____, ____, refrigeration, 2202, 3344, 3363
____, in California, 2141, 2236, 2700
____, in Canada, 2214, 2217, 2303, 2571, 2973, 3120
____, in Denmark, 2684
____, in Norway, 3102

Locker plants, (Continued)
____, in the East, 2292, 3052
____, in the Midwest, 2148, 2150, 2151, 2215, 2652, 2787, 2956, 3083, 3262
____, in the North, 3085, 3273
____, in the Northwest, 2177, 2276, 2290, 2359
____, in the South, 2294, 2418, 2437, 2488, 2630, 2676, 2876, 3118, 3119, 3153, 3239
____, ____, in Alabama, 2153
____, ____, in Georgia, 2289, 2350, 2663, 3210
____, ____, in Louisiana, 2291
____, ____, in Mississippi, 2216
____, ____, in Tennessee, 2152, 2288, 2317, 2895, 3075
____, insurance, 2215
____, laws, 2150, 2152, 2153, 2215, 2217, 2278
____, management of, 2202, 2279, 2293, 2461, 2717, 2824, 2890, 3042, 3210, 3220, 3235, 3237
____, ____, courses in, 2154, 2275, 2350, 2594, 2854, 3066
____, ozone in, 2336
____, processing of foods for storage in, 2249, 2598, 2678, 2768, 2805, 2871, 2930, 3008, 3181, 3193, 3194, 3200, 3300
____, retail sales in, 2139, 2434, 2437, 2460, 2461, 2474, 2475, 2476, 2493, 2613, 2666, 2671, 2715, 2764, 2913
____, temperatures for, 2228, 2438, 2689

Loganberries,
____, frozen, 3192

Loganberry juice,
____, frozen,
____, ____, bacteria, molds, and yeasts in, 2836

Low Temperature Research Station (England),
____, work on freezing, 2387

Lye for peach peeling, see Peaches, peeling of, by lye

Lyophilization, see Dehydrofreezing

Mackerel,
___, frozen, 3308

Marketing,
___, of frozen foods, 2165, 2208, 2251, 2253, 2254, 2262, 2296, 2297, 2298, 2307, 2308, 2313, 2328, 2390, 2419, 2423, 2460, 2493, 2494, 2505, 2513, 2639, 2646, 2658, 2666, 2672, 2685, 2726, 2732, 2764, 2786, 2788, 2796, 2821, 2823, 2834, 2861, 2869, 2883, 2889, 2915, 2944, 2998, 3004, 3033, 3045, 3099, 3145, 3164, 3179, 3231, 3232, 3268
___, ___, by chain stores, 2589, 2611, 2651, 3050
___, ___, by department stores, 2137, 2260, 2462, 2474, 2970, 3050
___, ___, costs of, see Economics, costs, of distribution
___, ___, display cases, see Equipment
___, ___, exportation of, 2271, 2272, 2351
___, ___, new techniques in, 2138, 2183, 2225, 2258, 2318, 2330, 2451, 2568, 2575, 2651, 2842, 3062, 3166, 3170, 3238, 3307, 3308
___, ___, refrigeration as a factor in, 2369, 2515, 2526, 2588, 2669, 2671
___, of frozen meat, 2188, 2271, 2272, 2299, 2587, 3263

Maxson, W. L., Corp., 2183, 2225

Meats,
___, bacteria in, see Bacteria, General, in meats; and, in frozen meats
___, curing of, 2689
___, ___, effect of smoke on bacteria, 2739
___, fats of, see Fats and oils, of frozen meats
___, freezing of, 2175, 2439, 2490, 2714, 2731, 2768, 2784, 2936, 3015, 3181, 3312, 3317
___, ___, effect of rate of, 2930
___, ___, ___, on flavor, 2395
___, ___, ___, on quality, 2395, 2694, 2695
___, ___, in Brazil, 2271, 2272
___, ___, methods for, 2710, 2739
___, ___, ___, air blast, 3117, 3260
___, ___, ___, immersion,
___, ___, ___, ___, in brine, 3329
___, ___, miscellaneous patents on, 3329, 3338, 3357, 3359
___, ___, preparation for, 2612, 3321, 3338
___, ___, selection for, 3321
___, frozen, 2109, 2110, 2133, 2163, 2269, 2371, 2427, 2600, 3058
___, ___, aging of, see also Meats, frozen, ripening of, 2210, 2265, 2689, 2698, 2714, 2898, 3092, 3181
___, ___, analyses of, see also Foods, frozen, analyses of, 2729
___, ___, bacteria in, see Bacteria, General, in frozen meats
___, ___, changes in, 2266, 2731, 3092
___, ___, color of,
___, ___, ___, discoloration of,
___, ___, ___, ___, causes of, 2935, 3260
___, ___, ___, ___, prevention of, 2698, 3299, 3323
___, ___, composition of,
___, ___, ___, changes in, 2935
___, ___, ___, ___, slow and quick frozen compared, 2395
___, ___, cooking of, 2370, 2395, 2848, 3087, 3186
___, ___, cuts of, 2714, 2871
___, ___, ___, as affecting quality, 2612, 2740
___, ___, demand for, 2109
___, ___, desiccation of, 2265, 2698, 3013

Meats, frozen, desiccation of, (Continued)
____, ____, ____, drip in, 2661, 2694, 2870
____, ____, ____, ____, factors affecting, 2395, 2695, 2739, 2898
____, ____, ____, freezer burn in, see Freezer burn
____, ____, ____, loss in bloom,
____, ____, ____, ____, chemical changes resulting in, 2698, 2822
____, ____, ____, shrinkage in, 2648, 2682, 2740, 3299
____, ____, deterioration of, see Meats, frozen, spoilage of
____, ____, digestibility of,
____, ____, ____, compared with fresh, 2725
____, ____, discoloration of,
____, ____, ____, prevention of, see Meats, frozen, color of, discoloration of, prevention of
____, ____, enzyme activity in, 2681
____, ____, flavor of, 2265, 2827, 3299
____, ____, ____, effects of freezing rate on, 2210
____, ____, ____, factors affecting, 2648, 2679, 2698
____, ____, handling of, see chiefly Storage, Transportation, and Marketing,
____, ____, ____, effect on quality, 2210, 3261
____, ____, marketing of, 2188, 2258, 2299, 2587, 3116
____, ____, odor of, 3299
____, ____, packaging of, 2310, 2474, 2612, 2648, 2661, 2688, 2698, 2714, 2829, 2886, 3181, 3260, 3299, 3321, 3323
____, ____, parasites in, 2375, 3015
____, ____, quality of, see also color of, desiccation of, flavor of, odor of, rancidity in, tenderness of, texture of,
____, ____, ____, effect of freezing on, 2210, 2370, 2898, 3055
____, ____, ____, effect of freezing rate on, 2435, 2694, 2695
____, ____, ____, factors affecting, 2299, 2822, 2827, 3261
____, ____, ____, tests for, 3092
____, ____, rancidity in,
____, ____, ____, chemical changes resulting in, 2822, 3242
____, ____, ____, factors affecting, 2648, 2822, 2935, 3242
____, ____, ripening of, see also Meats, frozen, aging of, 2210, 3092
____, ____, sausage from, 3016
____, ____, spoilage of, 2264, 3092
____, ____, storage of, 2229, 2235, 2456, 2647, 2714, 2886, 3261
____, ____, ____, changes during, 2310, 2679, 2757, 2935, 3013, 3092
____, ____, ____, in ozone atmosphere, 2822
____, ____, ____, tenderizing effect of, 2265
____, ____, swelling of,
____, ____, ____, factors affecting, 2740
____, ____, tenderness of, 2265, 2420, 2692, 2694, 2695, 2898
____, ____, texture of, 2692, 2694, 2695, 2739
____, ____, thawing of, 2848, 3186, 3253
____, ____, ____, chemical changes in, 2695
____, ____, ____, drip following, 2210, 2694, 2739, 2740, 3261
____, ____, ____, weight gain on, 3253
____, ____, tissues of, 2694, 2695, 2731
____, ____, ____, crystal formation in, see Freezing, effect on animal tissues
____, ____, vitamins in, 2491
____, microbiology of, 2729, 2731
____, molds in, see Molds, General, on meats
____, parasites in, 2420
____, ____, effect of freezing on, 2375
____, prepackaged, 2188, 2211, 2688, 2698
____, preservation of, 2236, 2396
____, ____, comparison of methods of, 2739

Meats,
___, products, 2517
___, smoked, 2739
___, storage of, 2440, 2441, 2739, 2822
___, tenderness of, 2847

Melons,
___, freezing of, 3193

Metals testing,
___, low temperature, 2982

Microbiological research,
___, in frozen foods, see also Bacteria, Molds, and Yeasts, 2182, 2413, 2414, 2754, 2836, 2971, 3005, 3069, 3082, 3104, 3115, 3138
___, ___, importance of, 2412, 2590, 2729, 2836

Microorganisms, see also Bacteria, Molds, and Yeasts, 2113, 2736, 3229

Milei products, 2396

Milk, see also Ice cream,
___, freezing of, 2407, 2408, 2506, 2514, 2609, 2618, 2925, 2927, 3203, 3243, 3335, 3373
___, frozen, 2218, 2463, 2538, 2540, 2564, 2635, 2718, 2823, 2856, 2877, 3027, 3032, 3067, 3167, 3168
___, ___, carotenoids in, 3204
___, ___, concentrated, 2514, 2565, 2734, 2925
___, ___, ___, reconstitution of, 2565, 3373
___, ___, condensed, 2406, 2521
___, ___, homogenized, 2377, 2378, 2406, 2565, 2925, 3203, 3205, 3206, 3373
___, ___, ice formation in, 2609
___, ___, oiling off of, 2407, 2408, 2734, 3206, 3207
___, ___, quality of, 2377, 2378, 2406, 2609, 3111, 3112, 3207
___, ___, ___, factors affecting, 3204, 3205
___, ___, storage life of, 2539, 2565, 2734, 2925, 3206, 3207

Mint, garden,
___, freezing of, 2518

Molds, General,
___, effect of freezing on, 2968
___, in cold or freezing storage,
___, ___, control of, 2968
___, in frozen foods, 2182, 3115
___, in frozen fruits and vegetables, 2544
___, in fruit juices,
___, ___, development of flavor by, 2759, 2760
___, ___, effect of temperature on, 2836
___, on meats,
___, ___, fats of,
___, ___, ___, effect of cold on, 2739

Molds, Specific,
___, Penicillium sp., 2918
___, Torula sp., 2836

Mollusks, see also specific items,

Mollusks, (Continued)
____, freezing of, 2114, 2116, 2678, 2994, 2995, 3318
____, frozen,
____, ____, marketing of, 3307, 3308

M

Mushrooms,
____, freezing of, 2583
____, frozen, 3104

Muskmelons,
____, freezing of, 3193

Mustard,
____, freezing of,
____, ____, varietal suitability for, 3162

Mutton,
____, frozen, 2371
____, ____, thawing of, 2370

Nectarines, see also Peaches,
____, freezing of,
____, ____, preparation for, 3114
____, ____, varietal suitability for, 3209
____, frozen, 3192

Niacin, see Vitamin B group, P-P factor

Nicotinic acid, see Vitamin B group, P-P factor

Nitrogen atmosphere,
____, in storage, 2387, 3159, 3160

Nutritive constituents of foods, see Foods, nutritive constituents of

Oils, see Fats and oils

Okra,
____, blanching of, 3291, 3297
____, frozen,
____, ____, quality of, 3291, 3297

Olives,
____, freezing of,
____, ____, frozen pack, 2744
____, frozen, 2699

Onions, 2944
____, blanching of, 3291, 3297
____, frozen,
____, ____, quality of, 3291, 3297

Orange juice, see also Fruit juices, citrus,
____, freezing of, 2199, 2464
____, ____, for concentration, 2131, 2353, 2637, 2675
____, ____, vacuum, 3355
____, frozen, 2222
____, ____, bacteria, molds, and yeasts in, 2836
____, ____, condensed, 2464, 2637, 2675
____, ____, ____, comparable to fresh, 2353
____, ____, quality of, 2195
____, ____, ____, factors affecting, 2529
____, ____, vitamin C in, see Fruit juices, citrus, frozen, vitamin C in

Oranges, see also Fruits, citrus,
____, freezing of,
____, ____, preparation for, 3114

Organoleptic tests, 2679, 3207, 3287
____, compared with physiochemical tests, 2604, 2806, 3070
____, compared with vitamin C retention, 2566, 3078
____, for fish, 2677, 2790, 3158, 3159, 3160
____, for fruits, 2604, 2709, 3061, 3088, 3089, 3090, 3298
____, for meats, 3013, 3299
____, for frozen baked products, 2640
____, for frozen cooked foods, 2601, 2938

Oxidation, 2190
____, of foods, 2480

Oysters,
____, freezing of, 2114, 2116, 2252, 2678, 2994, 2995, 3266
____, frozen, 3307, 3308

Pacific Grape Products Co., 2194, 2304

Packaging, see also under specific items, 2111, 2328, 2333, 2410, 2467, 2478, 2479, 2549, 2551, 2574, 2612, 2685, 2720, 2776, 2789, 2812 2923, 2965, 3014, 3063, 3064, 3166, 3199, 3324, 3325
____, accessories, 2220, 2832
____, containers, 2191, 2219, 2239, 2243, 2347, 2483, 2718, 2985, 2986, 3146, 3184
____, ____, bags, 3084
____, ____, ____, cellophane, 2222, 2326, 2535
____, ____, ____, cotton, 2357
____, ____, ____, vegetable parchment, 2241
____, ____, boxes, see also Packaging, containers, cartons,
____, ____, ____, folding, 2226
____, ____, brine-coil equipped, 2239
____, ____, cans, 2098, 2189, 2194, 2263, 2304, 2352, 2414, 2448, 2464, 2607, 2677, 3041, 3260
____, ____, ____, metal and fiber, 2224, 2356, 2535, 3169
____, ____, cartons, 2098, 2218, 2364, 2445, 2852, 2969, 2995, 3078, 3202, 3224, 3364
____, ____, ____, corrugated, 2235
____, ____, ____, fiberboard, 3251
____, ____, ____, outside wraps for, 2445, 3010
____, ____, compartmented plates, 2225
____, ____, cups,
____, ____, ____, paper, 3327
____, ____, effect of shape on freezing of, 2931, 2936, 2983
____, ____, gas-tight, 2680, 2691
____, ____, glass, 2098, 2535
____, ____, hampers, 2239
____, ____, labeling of, 2382, 2658, 3306
____, ____, liners for, 2098, 2235
____, ____, metal, see also Packaging, containers, cans, 2396, 2534, 2550
____, ____, ____, aluminum, 2239, 2330
____, ____, ____, steel, 2239, 2345
____, ____, multicompartment, 2225
____, ____, petroleum waxes used on, 2467
____, ____, shipping, 2239, 2612, 2647, 2992, 3135, 3251, 3322
____, ____, transparent, see also individual types, 2572
____, ____, wrappers for, see also Packaging, containers, cartons, outside wraps for, 2144, 3169
____, ____, ____, ink-colors of, 2104, 3345
____, ____, ____, ____, toxicity of, 2104
____, display value of, 2111
____, machinery, 2145
____, ____, for dip-coating, 2310
____, materials for 2396, 2479, 2550, 2648, 2789, 2829, 2831, 3031, 3247
____, ____, aluminum foil, 2223, 2347, 2354, 2691, 2910, 2962, 3031, 3084, 3169, 3299
____, ____, cellophane 2222, 2264, 2326, 2347, 2445, 2648, 2661, 2870, 2935, 2949, 2962, 2992, 3159, 3299
____, ____, cellulose acetate and acetate-butyrate, 2226
____, ____, cryovac, 2101
____, ____, ethyl cellulose, 2572
____, ____, glassine, 3031
____, ____, latex, see Packaging, materials for, rubber compositions,
____, ____, paper, 2648
____, ____, ____, moisture-resisting, 2870, 2935, 3031
____, ____, ____, ____, waxed, 2467, 2534, 2535, 2962, 3207, 3299

Packaging, materials for, (Continued)
___, ___, parafilm, 2101, 3011, 3031
___, ___, parlon, 2101
___, ___, passage of moisture through, 2101, 2223, 2304, 2364, 2467, 2479, 2550, 2572, 2605, 2648, 2677, 2829, 2870, 2886, 2995, 3130
___, ___, ___, methods for determination of, 2985, 2986, 3031, 3041, 3276
___, ___, pliofilm, 2101, 3299
___, ___, pliolite, 2101
___, ___, rubber compositions, 2479, 2503
___, ___, thermoplastic wax coating, 2211, 2310, 3011, 3031
___, ___, tin, 2969, 2995
___, ___, transparent, see also specific materials, 2479, 2572, 2661, 3159, 3170
___, ___, ___, Vinylite, 2226, 2239
___, methods of, 2372, 2572, 2789, 2870, 3041
___, ___, automatic, 2347, 2550
___, ___, ___, in cellophane, 2326
___, ___, dip-coating, 2211, 2693, 3011
___, ___, hermetically sealing, 2479, 2632, 3011
___, ___, in an atmosphere of nitrogen, 2387, 2985, 2986
___, ___, in cartons, 2932
___, ___, vacuum pack, 2480, 2677, 2702, 3260
___, miscellaneous patents on, 3341, 3345, 3354, 3364
___, sizes preferred for, 2193, 2550, 2572, 2591, 2800, 3041, 3307
___, to facilitate thawing, 2482, 2485
___, to prevent desiccation, 2486, 2648, 2698, 3011, 3323
___, to prevent discoloration, 2698, 3323
___, to prevent oxidation, 2677, 3011
___, to protect flavor, 2648, 2677, 2698

Packers,
___, of frozen foods, 2162, 2238, 2576, 2623, 2941, 2942, 3263, 3304
___, ___, directories of, 2168, 2171, 2244, 2245, 2246, 2253, 2254, 2256, 2277, 2315

Palatability tests, see Organoleptic tests

Pan-American Freezers, Ltd., 2148

Pantothenic acid, see Vitamin B group, filtrate factor

Papayas,
___, freezing of, 2252, 2335

Parasites, specific,
___, Trichinella spiralis, 2420
___, ___, effects of low temperatures on, 2375, 3015

Peaches,
___, blanching of, 3061, 3097, 3190
___, browning of, 2398
___, ___, retarding and preventing, 2149, 3061, 3097, 3187, 3190, 3228, 3257, 3279, 3294
___, freezing of, 2284, 3140
___, ___, methods for,
___, ___, ___, dry sugar pack, 2144, 2398, 3061, 3173
___, ___, ___, syrup pack, 2144, 2398, 2747, 3061, 3094, 3095, 3173, 3193, 3228

Peaches, freezing of, (Continued)
____, ____, plants for, 3214
____, ____, preparation for, 2959, 3018, 3114, 3302
____, ____, ____, addition of pectin, 3192
____, ____, ____, addition of vitamin C, 2144, 2398, 3061, 3257, 3279, 3282, 3294, 3295, 3302
____, ____, varietal suitability for, 2707, 3017, 3061, 3209, 3279, 3295, 3302
____, frozen, 2327, 2340, 2874
____, ____, flavor of, 2755, 3173
____, ____, nectar, 2527
____, ____, quality of, 2255, 2747, 3173
____, ____, ____, factors affecting, 2735, 3061, 3097, 3192
____, ____, standards for, 3284
____, ____, storage of, 2398, 3185, 3298
____, ____, thawing of, 2398
____, ____, use in wines and brandies, 2641
____, ____, vitamin C in, 2398
____, fumigation of, 2755
____, peeling of, 3061
____, ____, by lye, 3295
____, production of, 2122
____, storage of, 2470

Pears,
____, freezing of, 3193
____, frozen,
____, ____, nectars, 2527
____, production of, 2122

Peas, 2245
____, blanching of, 2143, 2245, 2387, 2394, 2934, 2938, 2975, 2979, 3215, 3297
____, ____, tests for adequacy of, 3286
____, dehydrofreezing of, 2387
____, freezing of, 2284, 2337, 2936, 3140, 3162
____, ____, by air blast, 2245, 2301, 2518, 2774, 2934
____, ____, ____, combined with refrigerated surface contact, 2938
____, ____, by immersion, 2159
____, ____, by shaker-type freezer, 2132
____, ____, effect of maturity on, 2143, 2167, 2938
____, ____, grading for, 2938
____, ____, prefreezing treatment, 2245, 2926, 2938, 3340
____, ____, ____, to reduce skin splitting, 2468
____, ____, sanitation and bacteriological control in, 2143
____, ____, suitability for, 2938
____, ____, ____, varietal selection of, 2108, 2143, 2245, 3162, 3184, 3215
____, frozen, 2257, 2340, 2776
____, ____, enzyme activity in, 2885
____, ____, nutritive constituents in, 2158, 2938
____, ____, quality of, 2443, 2444, 3297
____, ____, ____, carbohydrates in, 2938
____, ____, ____, factors affecting, 2167
____, ____, ____, tenderness of, 2938
____, ____, ____, texture of, 2545, 2938
____, ____, standards for, 2245
____, ____, storage of, 2245, 2938
____, handling of, 2938
____, storage of, 2470

Peas, (Continued)
____, vitamin A in, 2838, 2850, 3076
____, vitamins B_1 and B_2 in, 2401, 2838, 2850, 3076
____, vitamin C in, 2387, 2401, 2566, 2838, 2850, 3076, 3215

P Pectin-Pectinates, see also Fruits, freezing of, use of pectin-pectinates in,
____, precipitation of, 2396
____, ____, effect on vitamin C, 2430

Peeling, 3020, 3123
____, by dipping in paraffin, 2791
____, by electronics, 3277
____, equipment for, 3131
____, ____, radiant heat root peeler, 2121
____, high temperature lye method, 2878, 3295
____, in brine, 2134, 2878
____, steam batch process, 2878, 3061

Peppers,
____, freezing of, 2791
____, ____, varietal selection for, 2662

Peroxidase test,
____, for adequacy of blanching, 2790, 3286, 3287, 3289

Pheasants,
____, frozen, 2448

Pies, see also Baked products,
____, freezing of, 3196
____, frozen, 2163, 2445, 2482, 2486, 2601, 3045, 3149, 3270
____, ____, mince meat, 2257
____, fruit, 2255, 2996
____, ____, frozen, 2363, 2426, 2499, 2724, 2937, 3295
____, ____, ____, unbaked 2136, 2246, 2482, 2499, 2601

Pineapples,
____, freezing of, 2252
____, ____, effect of temperature on, 2931
____, ____, preparation for, 3114
____, frozen, 2874

Plants, see also Equipment,
____, commercial, 2346, 2396, 2411, 2576, 2592, 2623, 2639, 2649, 2717, 2768, 2813, 2888, 2890, 2908, 3048, 3057, 3075, 3110, 3140, 3239
____, ____, air blast, 2977, 3119, 3120
____, ____, bacteria in, 3006
____, ____, ____, control of, 2945
____, ____, costs of, see Economics, costs, of plants
____, ____, for freezing of fish, see Fish, freezing of, plants for
____, ____, immersion freezing, 2194, 2304, 2352, 2607, 2846
____, ____, proper location of, 2343, 3137

Plants (vegetable),
____, physiology of, 2971

Plum nectar,
____, frozen, 2527

Plums,
___, freezing of, 2301, 2518, 2959, 3140, 3183, 3193
___, ___, varietal suitability for, 3209
___, frozen, 2735, 2874

Polyphase freezing process, 2392

Pork,
___, frozen, 2491
___, ___, and beans, 2577, 3113
___, ___, causes of rancidity in, 2935, 3242, 3260
___, ___, cooking of, 3117
___, ___, quality of, 2375, 3253
___, ___, ___, factors affecting, 2375, 2491, 2648, 2935, 3242, 3260
___, ___, thawing of, 3253
___, storage of, 2491
___, ___, at freezing temperatures, 2263, 2456, 2935, 3260
___, ___, quality retention in, 2648, 2935

Potatoes, 2396
___, blanching of, 2840, 2975, 2979, 3131, 3223
___, freezing of, 2160, 3025
___, frozen,
___, ___, acetone extracts of,
___, ___, ___, fluorescence in, 2928
___, ___, fluorescence of, 2928
___, peeling of, 2121, 2134, 2878, 3131
___, vitamin C in, 2566, 2944

Potatoes, sweet,
___, blanching of, 3131
___, freezing of,
___, ___, preparation for, 3131
___, peeling of, 2121, 2134, 3131
___, storage of, 3254
___, vitamins in, 2444, 2566

Poultry,
___, freezing of, 2103, 2175, 2337, 2404, 2767, 2783, 2784, 2821, 2857, 2858, 3317
___, ___, drawing for, 2333, 2873
___, ___, factors affecting rate of, 2930
___, ___, handling for, 2221, 2333, 2821, 2949
___, ___, holding for, 2780, 3225
___, ___, methods for,
___, ___, ___, immersion, 2949
___, ___, ___, indirect contact, 2949, 3343
___, ___, miscellaneous patents on, 3343
___, ___, precooling of, 2333, 2767, 2780, 3175, 3225
___, frozen, 2318, 2450, 2600, 2617, 2653, 2907, 3105, 3145, 3265, 3280
___, ___, cooking studies with, 2318, 2701, 3117
___, ___, desiccation of,
___, ___, ___, freezer burn in, see also Freezer burn, 2873, 2910, 2969
___, ___, ___, loss in bloom,
___, ___, ___, ___, factors affecting, 2968
___, ___, ___, shrinkage in, 3299
___, ___, eviscerated, 2221, 2316, 2320, 2333, 2389, 2553, 2619, 2821, 3175, 3224
___, ___, ___, to eliminate cleaning and drawing, 2780, 2873

Poultry, frozen, (Continued)
____, ____, flavor of, 2316, 3299
____, ____, ____, factors affecting, 2316, 3175
____, ____, packaging of, 2211, 2310, 2320, 2333, 2389, 2767, 2873, 2910, 2949, 2968, 2969, 2992, 3224, 3299
____, ____, rancidity in, 3224
____, ____, ____, chemical changes resulting in, 3072
____, ____, storage of, 2316, 2821, 2910, 2969, 3185
____, ____, thawing of, 2780

Precooking,
____, in blanching of foods, 3097
____, of foods,
____, ____, for freezing, 2257, 2354, 2374, 2614, 2719, 2720, 2721, 2778, 2964, 3179, 3191, 3264, 3285
____, ____, ____, bacteria in, 2367, 2719, 3006
____, ____, ____, bakery products, 2136
____, ____, ____, fish, 2256, 2678, 2954, 3266
____, ____, ____, meat dishes, 2183, 2318, 2323, 2600, 2653, 2723, 3058, 3084, 3117, 3317
____, ____, ____, pumpkin pie stock, 2129
____, ____, ____, quality of, 2721
____, ____, ____, ready-to-serve, 2183, 2225, 2256, 2318, 2323, 2577
____, ____, ____, vegetables, 2178, 2323
____, ____, ____, whole meals, 2183, 2323, 2330, 2600, 2936, 3221

Prefreezing treatment, see also Blanching; Peeling; Precooking; and under specific items, freezing of, 2176, 2354, 2366, 2384, 2426, 2469, 2470. 2526, 2528, 2529, 2532, 2581, 2613, 2702, 2916, 2917, 2919, 2996, 3020, 3061, 3078, 3160, 3281, 3302
____, equipment for, 2125, 2310, 2333, 2345, 2667, 2774, 2821, 2922, 2926, 2978, 3131, 3194
____, ____, picking and trimming table, 2124, 2333

Proteins,
____, denaturation of, 2620, 2719, 2721, 2753, 2775, 3229
____, effect of cooking on, 2859, 3285
____, effect of freezing on, 2583, 2733, 2859, 3055

Prunes,
____, production of, 2122

Pumpkins,
____, freezing of,
____, ____, stock for pie, 2129

P

Q

Quick freezing, see Freezing; Home freezing; Foods, frozen, industry; and entries under specific items

Rabbits,
___, frozen, 2756

Raspberries,
___, freezing of, 2810, 3183
___, ___, preparation for, 3114
___, ___, varietal suitability for, 3089, 3184, 3209, 3320
___, frozen, 2545, 2937
___, ___, bacteria, molds, and yeasts in, 2736
___, ___, quality of, 3192
___, ___, sampling of, 2903
___, ___, standards for, 2810
___, ___, storage of, 3298
___, ___, vitamin A in, 3089
___, ___, vitamin C in, 2810, 3089
___, storage of, 2470, 2810, 3089

Refrigerants,
___, ammonia, 2148, 2324, 2360, 2472, 2846, 3038
___, brines, 2228, 2609, 3098, 3156, 3159, 3253
___, ___, calcium chloride, 2146
___, ___, eutectic salt (NaCl) ice, 2500, 3310
___, carbon dioxide, 2229, 2232, 2267, 2314, 2325, 2716, 3233, 3322
___, eutectic NaOH lye, 3310
___, Freons, 2425, 2763, 3249, 3371
___, ice and salt, 2716, 3360
___, nitrous oxide, 2835, 3233
___, ___, compared with carbon dioxide, 3233
___, vapor pressures of, 2687

Refrigerated barges, see Transportation, of frozen foods, equipment for, refrigerated barges

Refrigerated cars, see Transportation, of frozen foods, equipment for, railroad cars

Refrigerated ships, see Transportation, of frozen foods, equipment for refrigerated ships and Fish, freezing of, at sea

Refrigerated stores, see Locker plants, retail sales in

Refrigerated trucks, see Transportation, of frozen foods, equipment for, refrigerated trucks

Refrigerated warehouses, 2184, 2212, 2234, 2276, 2278, 2362, 2405, 2438, 2476, 2492, 2612, 2622, 2649, 2655, 2656, 2669, 2711, 2782, 2816, 2891, 2940, 2941
___, directories of, 2169, 2343
___, maps of, 2670

Refrigeration, general, 2106, 2179, 2504, 2517, 2520, 2697, 2967, 2968, 3028, 3313
___, equipment, 2185, 2230, 2295, 2303, 2381, 2383, 2396, 2397, 2411, 2559, 2608, 2647, 2660, 2674, 2711, 2762, 2888, 2904, 2911, 3056 3135, 3174, 3248, 3249, 3342
___, ___, measurement instruments, 2477, 2905, 3053

Refrigeration Research Foundation, 2334, 2560, 3261

R

Refrigerators, 3349
____, for quick-freezing, 3172, 3241, 3357, 3358, 3365
____, ____, portable, 2117

R

Rhubarb,
____, freezing of, 2804, 2959
____, frozen, 2545

Riboflavin, see Vitamin B group, vitamin B_2

Rolls, see also Baked products,
____, frozen, 2445, 2486, 2601

Salmon, 3131, 3308
___, freezing of, 2112, 2205
___, frozen, 2497, 3158, 3159, 3160, 3308

Salmonberries, see also Raspberries,
___, freezing of, 3320

Sanitation, see also Bacteria, Molds, Yeasts, 2416, 2502, 2574, 2616, 2721, 2821, 2862, 2944, 3115, 3179, 3217, 3218, 3235
___, tests for index to, 2544, 2736, 3006

Sausage,
___, freezing of, 3321
___, from frozen meat, 3016
___, frozen,
___, ___, rancidity in, 3242, 3260

Scalding, see Blanching and Prefreezing treatment

Seafoods, see also Fish, 3308
___, bacteria in, see Bacteria, General, in seafoods
___, freezing of, 2354, 2385, 2386, 2678, 2793
___, ___, in Louisiana, 2256, 2605, 2667, 3266
___, frozen, 2231, 2232, 2497, 2536, 2645, 3308, 3313
___, ___, preparation of, 2147
___, ___, ___, sanitary measures in, 3159
___, ___, thawing of, see Thawing

Seitz-Boni method, 2759, 2760

Sharp freezing, see Freezing, frozen pack

Shellfish, see Mollusks

Shrimp, 3308
___, freezing of, 2140, 2252, 2256, 2337, 2573, 2605, 2667, 2799, 3266
___, frozen, 2201, 2642
___, ___, marketing of, 2115, 2256, 3308
___, ___, packaged, 2115, 2605, 2799
___, ___, storage of, 3185

Singer process, 2241

Slow freezing, see Freezing, frozen pack and Locker plants

Snap beans, see Beans

Soups,
___, frozen, 2600
___, ___, split pea, 2257

Soybeans, green edible,
___, blanching of, 3215, 3290, 3297
___, freezing of, 2268
___, ___, varietal suitability for, 2801, 2803, 3215
___, frozen,
___, ___, nutritive constituents in, 2158, 2268, 3290, 3297
___, ___, vitamins in, 2401, 2803, 2838, 3215

S

Specific gravity,
____, of frozen foods,
____, ____, as index to quality, 2938

Spinach,
____, blanching of, 2253, 2751, 3215
____, freezing of, 2160, 2253, 2301, 2337, 2518, 2751, 2757, 2931, 3140
____, ____, varietal suitability for, 3163, 3215
____, frozen, 2327, 2340, 2653, 2776
____, ____, nutritive constituents in, 2567, 2751
____, ____, quality of, 2253, 2545
____, ____, vitamin A in,
____, ____, ____, compared with fresh and processed, 2599
____, ____, vitamin C in, 2566, 2751, 2785, 3215

Spoilage, see also Bacteria; Molds; Enzymes, General, activity of; Thawing; etc., 2677
____, following thawing, 2739
____, indications of and inspection for, 2935
____, of frozen foods,
____, ____, factors affecting, 2629, 2689
____, problems, 2753
____, ____, suggestions for remedying, 2486, 2629, 3158, 3159, 3160

Squash,
____, blanching of, 3297
____, frozen, 2653
____, ____, quality of, 3297
____, ____, storage of, 3185
____, ____, vitamins in, 2401, 3091

Starch,
____, in vegetables, see Carbohydrates

Storage, 2517
_ _, air circulation in, 2234, 2311, 2711, 2878, 2969, 3081, 3132
____, cold, 2385, 2386, 2396, 2401, 2404, 2406, 2548, 2592, 2649, 2669, 2670, 2739, 2845, 2891, 2892, 2897, 3007, 3028, 3098, 3139
____, ____, ripening fruit in, 2755
____, effects on color in, 2157, 2640
____, effects on flavor in, 2157, 2377, 2378, 2640, 3013, 3111, 3112
____, effects on vitamins, 2157, 2769, 2775, 3180,
____, ____, vitamin C, 2131, 2775, 2785, 2803, 3124, 3180, 3215
____, humidity in, 2386, 2711, 2775, 2878, 2911, 3208
____, in inert gases, see Carbon dioxide, etc.
____, insulation in, 2376, 2711
____, of frozen foods, 2383, 2410, 2472, 2897, 2975, 2977, 3024
____, ____, air flow during, 2311, 2325, 2711, 2943, 2969, 3120
____, ____, biological activity during, 2367, 2681, 3274
____, ____, color of,
____, ____, ____, effect of dextrose on, 2604
____, ____, effect on bacteria, see Bacteria, General, in frozen fruits and vegetables and Bacteria, General, in storage
____, ____, effect on quality, 2375, 2377, 2378, 2486, 2640, 2963, 3286, 3287, 3288, 3289, 3290, 3291, 3297, 3298
____, ____, effect on vitamins, 2752, 2769, 2775, 2850, 3078, 3088, 3089, 3090, 3091
___, ____, enzyme activity in, 2616, 2685

Storage, of frozen foods, (Continued)
___, ___, equipment for, 2212, 2492, 3309
___, ___, ___, design of, 2647, 2711
___, ___, humidity control in, see also Storage, humidity in, 2647, 2943, 3309
___, ___, temperatures for, 2377, 2524, 2574, 2643, 2648, 2680, 2886, 2943, 3185
___, oxidation during, 2935, 3112
___, prior to freezing, 2470, 2573, 3098
___, problems in, 2470, 2669
___, temperature, 2235, 2600, 2656, 2740, 2878, 2966, 3013, 3132, 3208, 3254, 3261, 3298, 3309
___, ___, effect on growth of bacteria and molds, 2264, 2367, 2414, 2482, 2689, 2736, 3158, 3159, 3244

Strawberries, 2344, 3266, 3320
___, freezing of, 2284, 2317, 2344, 3301
___, ___, effect of temperature, 2393
___, ___, effect on flavor of, 2204, 3088
___, ___, preparation for, 2959, 3114, 3340
___, ___, varietal suitability for, 2344, 2543, 2604, 2632, 2708, 3184, 3209, 3320
___, frozen, 2327, 2340, 2351
___, ___, bacteria, molds, and yeasts in, 2204, 2736
___, ___, color of, 2708, 3088
___, ___, enzyme activity in, 3000
___, ___, flavor, 2604, 3000, 3088
___, ___, ___, acidity as affecting, 2708
___, ___, handling of, 2632
___, ___, leakage of juices,
___, ___, ___, reduced by pectin, 3192
___, ___, packaging of, 2344, 2708
___, ___, prefreezing treatment of, 2344, 2632
___, ___, preserves, 2603
___, ___, quality of, 2545
___, ___, ___, preserved with sugar syrup, 2393, 2604, 2708, 2903, 3000, 3192
___, ___, sampling of, 2903
___, ___, standards for, 2632, 2708
___, ___, storage of, 3088, 3298
___, ___, vitamin C in, 3088
___, storage of, 2470
___, varieties of, 2543, 2604

String beans, see Beans

Sucrose, see Sugar

Sugar, 2641
___, effect of freezing on, 2810, 3078
___, ___, effect on bacteria, 2836, 3229
___, solutions and syrups, 2500, 2501, 2537, 2604, 2703, 2704, 2742, 2747, 3094, 3095, 3173, 3190, 3302, 3340

SO_2 treatment,
___, of foods for freezing, 2524, 2751
___, ___, to prevent discoloration, 2702, 2703, 2704, 3187, 3190
___, solution formula,
___, ___, testing strength of, 2582

S

Sweet potatoes, see Potatoes, sweet

Swiss chard,
____, freezing of,
____, ____, varietal suitability for, 3162
____, frozen,
____, ____, vitamin A in, 2599
____, ____, vitamin C in, 2566

Swordfish,
____, frozen, 3308

Tangerine juice, see also Fruit juices, citrus,
___, frozen, 2131

Tangerines, see also Fruits, citrus,
___, frozen, 2465

T

Taylor immersion process, see T. V. A. process

Temperature, see also Thermodynamics,
___, control, 2324, 2477, 3053, 3132, 3371
___, measurement, 2375, 2406, 2465, 2937, 3345
___, of freezing, see also Thermodynamics, freezing points, 2198, 2267, 2407, 2408, 2482, 2620, 2696, 3064, 3240
___, ___, effect on bacterial growth, see Bacteria, General, in frozen foods, growth of, effect of time and temperature on
___, ___, methods for obtaining low, 2477, 2697, 2711, 3053
___, ___, relation to concentration, 2506, 2537, 2747
___, ___, relation to time, 2930, 2931, 3049
___, thermal considerations, 2465, 2558, 2559, 2608, 2868, 3132

Tenderness, 2743
___, apparatus for determining,
___, ___, tenderometer, 2938

T. V. A. process, 2164, 2193, 2762, 3047, 3103, 3266

Testing of foods, see Foods, frozen. analyses of

Texture,
___, of foods, 2544, 2581, 2582, 2629, 2692, 2743
___, ___, testing methods, 2640, 2694, 2695

Thawing, see also under types of foods and under specific items, 2936, 3186
___, bacterial effects in, see Bacteria, General, in frozen fruits and vegetables, after thawing; Bacteria, General, in frozen foods, growth of, after thawing; and Bacteria, General toxins of, formation in frozen foods, after thawing
___, by electronic heat, 2348, 2482, 2483, 2484, 2485, 2629, 2800, 2863, 3087, 3152, 3190
___, drip following, 2739, 2740
___, effect of rate of, 2721, 2800
___, effect on animal tissues, see Freezing, effect on animal tissues, drip on thawing
___, effect on nutritive constituents, 2370, 2429
___, effect on plant cells,
___, ___, fluorescence exhibited by, 2928
___, effect on vitamins, 2398
___, equipment for, 2185, 2363, 2425, 2863
___, of eggs, 2481, 2800, 2963
___, of fish and seafoods,
___, ___, comparison of methods,
___, ___, ___, by chemical determinations, 2793
___, of fruits and berries,
___, ___, chemical changes in, 2545, 2704
___, ___, firmness after, 2703, 3000, 3190
___, ___, loss of juice following, 3190
___, ___, temperature for, 3114
___, of milk, 2377, 2378, 2407, 2408, 3203
___, of vegetables, 3000, 3108

Thawing, of vegetables, (Continued)
___, ___, changes resulting from, 2545
___, spoilage following, see Spoilage, following thawing
___, temperatures for, 2926, 3159, 3253
___, use following, 2703
___, within package, 2886, 3108, 3156

Thermodynamics, see also Temperature,
___, freezing points, see also Temperature, of freezing, 2198, 2309, 2393 2506, 2537, 2620, 2696, 2813, 3049, 3240
___, heat transfer, 2306, 3064
___, ___, of frozen foods, see Thermodynamics, of frozen foods
___, latent heats, 2835
___, of frozen foods, 2620, 2696
___, ___, heat transfer, 2608, 2712, 2931, 2937
___, ___, specific heats, 2393, 2545
___, specific heats, 2393, 2545

Thiamin, see Vitamin B_1

Thiochrome reaction,
___, for determining vitamin B_1 (thiamin), 2961

Tomato juice,
___, freezing of, 2532, 2936
___, frozen, 2933
___, ___, fortified with vitamin C, 3228

Tomatoes,
___, freezing of, 2301, 2518, 2933
___, ___, preparation for, 2959
___, ___, varietal suitability for, 2662
___, frozen,
___, ___, collapse on thawing, 2933

Toxic substances in frozen foods,
___, prevention of formation, 3114

Transportation,
___, of foods for freezing, 2509, 2593, 2647, 3028
___, of frozen foods, 2097, 2184, 2320, 2351, 2459, 2574, 2593, 2673, 2751, 2866, 2867, 2944
___, ___, containers for, see Packaging, containers, shipping
___, ___, equipment for, 2509, 2647, 3028, 3136
___, ___, ___, airplanes, 2357, 2497, 2668
___, ___, ___, railroad cars, 2097, 2184, 2239, 2314, 2324, 2325, 2360, 2465, 2660, 2668, 2716, 2990, 3051, 3106
___, ___, ___, refrigerated barges, 2147, 2228
___, ___, ___, refrigerated ships, 2184, 2229, 2497, 2573, 2668, 2674, 2716, 3056, 3248, 3249, 3251
___, ___, ___, refrigerated trucks, 2142, 2187, 2201, 2235, 2239, 2248, 2311, 2314, 2319, 2322, 2476, 2546, 2612, 2668, 2716, 2855, 2984, 3022, 3137, 3251, 3310
___, ___, ___, tropical, 2647

Tuna, 3308
___, freezing of, 2472, 2849
___, frozen, 2849

Turkeys, 2448
___, freezing of, see also Poultry, 2333, 2992
___, frozen, 2653
___, ___, packaging of, 2992

Turnip greens,
___, blanching of, 3297
___, frozen,
___, ___, quality of, 3297

Turnips (rutabagas, swede, etc.),
___, blanching of, 3223

T

U

United Food Distributors, Inc., 2138

Varietal suitability, see under types of foods and specific items

Vegetable juices, see also Fruit juices and Juices,
____, freezing of, 2532, 2712, 2759
____, frozen,
____, ____, quality of, 2532

Vegetables,
____, blanching of, 2938, 3197, 3223, 3286, 3287, 3288, 3289, 3290, 3291, 3292, 3293
____, ____, effect on color of, see Blanching, effect on color
____, ____, effect on enzymes in, see Blanching, effect on enzymes
____, ____, effect on flavor of, see Blanching, effect on flavor
____, ____, effect on nutritive constituents of, 2839, 3289
____, ____, effect of water on, 2934
____, ____, loss of weight following, 3223
____, ____, subsequent cooling of, 3197
____, ____, time and temperature of,
____, ____, ____, effect of physical characteristics on, 2934
____, freezing of, 2096, 2099, 2108, 2129, 2207, 2251, 2252, 2253, 2254, 2274, 2337, 2396, 2401, 2439, 2508, 2563, 2626, 2713, 3096, 3101, 3127, 3162, 3176, 3177
____, ____, effect of rate of, 2159, 2930, 2983
____, ____, effect on color of, 2511
____, ____, effect on flavor of, 2511
____, ____, methods for, 2944
____, ____, ____, air blast, 2934, 2983
____, ____, ____, immersion, 2364, 2758
____, ____, ____, ____, in alcohol, 2304
____, ____, miscellaneous patents on, 3340, 3368
____, ____, preparation for, see also Blanching, 2143, 2544, 2706, 2770, 2944, 2989, 3216
____, ____, varietal suitability for, 2422, 2686, 2761, 2811, 2944, 3074, 3077, 3129, 3162, 3184, 3208, 3216
____, ____, ____, seasonal and maturity variation in, 2469, 2706, 2770
____, frozen, 2133, 2259, 2269, 2273, 2349, 2357, 2383, 2495, 2541, 2653, 2681, 2776, 3059
____, ____, advantages of, 2351
____, ____, bacteria in, see Bacteria, General, in frozen fruits and vegetables
____, ____, brine used in, 3289
____, ____, changes in weight in, 3130
____, ____, color of, 3162
____, ____, cooking of, see also specific vegetables, cooking of, 2401, 2429, 3000
____, ____, discoloration of, 2745
____, ____, flavor of, 2268, 2443, 3162
____, ____, ____, effect of oxidation on, 2544
____, ____, handling of,
____, ____, ____, effect on quality, 2415, 2469, 3223
____, ____, molds in, see Molds, General, in frozen fruits and vegetables
____, ____, packaging of, 3230
____, ____, precooked, see Precooking, of foods, for freezing, vegetables
____, ____, purees, 3317
____, ____, quality of, 2268, 2745, 3252
____, ____, ____, factors affecting, 2469, 2526, 2706
____, ____, ____, tests for determining, 2158, 2531, 2533, 2545
____, ____, spoilage of, 2736, 2885
____, ____, standards for, see also standards for individual vegetables--

Vegetables, frozen, standards for, (Continued), peas, lima beans, etc., 2368, 2899, 2944
___, ___, storage of, 2944
___, ___, ___, temperature for,
___, ___, ___, ___, effect on color and flavor, 3185
___, ___, thawing of, see also Thawing, of vegetables, 2485
___, ___, vitamin A in, 2838, 2850
___, ___, vitamin B_1 in, 2838
___, ___, ___, effect of blanching on, 2850
___, ___, ___, effect of cooking methods on, 2443
___, ___, vitamin B_2 in, 2443, 2838
___, ___, vitamin C in, 2838
___, ___, ___, effect of cooking method on, 2443, 2567, 2706
___, ___, ___, effect of freezing on, 2850
___, ___, ___, effect of storage on, 2706, 2785
___, ___, yeasts in, see Yeasts, in frozen fruits and vegetables
___, growing of, 2337, 2469, 2497, 2578, 2736, 2770, 2989, 3074, 3162
___, purees, see Vegetables, frozen, purees
___, storage of, 2135, 2470, 3208
___, tenderness of, 2770
___, ___, apparatus for measuring, see also Tenderness, apparatus for determining, 2938
___, vitamins in, 2432, 2443, 2444, 2718
___, ___, vitamin A, 3076
___, ___, ___, effect of varietal differences on, 3091
___, ___, ___, fresh compared with processed, 3076
___, ___, vitamin B_1, 2443, 2444, 2738, 3076
___, ___, vitamin B_2, 2738, 3076
___, ___, ___, effect of cooking methods on, 2443, 2444, 2738
___, ___, vitamin C, 2443, 2444, 2738, 2785, 3076, 3078, 3215
___, ___, ___, effect of holding before blanching on, 2706
___, ___, ___, effect of seasonal maturity, size, and varietal differences on, 2706, 3076
___, washing of,
___, ___, effect on bacteria, see Bacteria, General, in frozen fruits and vegetables, proper washing as affecting

Velva fruit, see Fruits, frozen, pulps and purees

Vitamin A (carotene), see also various types of foods and specific items,
___, effect of blanching on, 2631, 2850, 3286, 3326
___, effect of cooking on, 2803, 2993
___, effect of storage on, 2775, 2803, 2991, 3089, 3091, 3180
___, in foods, 2631, 2709, 2993, 3076
___, ___, methods for determination of, 2775, 2803, 3089, 3091, 3326
___, ___, ___, through carotenoids (provitamin A), 3205

Vitamin B group,
___, vitamin B_1 (thiamin, aneurin), see also various types of foods, vitamin B_1 in,
___, ___, determination of, 2443, 2444, 2775
___, ___, ___, by thiochrome reaction, 2961
___, ___, effects of freezing on, 3126, 3180
___, ___, in foods, 2738, 2775, 2803, 2850, 2991, 3076
___, vitamin B_2 (riboflavin), see also various types of foods, vitamin B_2 in,
___, ___, determination of, 2443, 2444
___, ___, effect of freezing on, see also Vegetables, vitamin B_2 in, 2803, 3126, 3180

Vitamin B group, vitamin B_2, (Continued)
____, ____, in foods, 2738, 2803, 3076
____, P-P factor,
____, ____, in fish, 2769
____, ____, in foods, 2491, 2709, 2803, 3076
____, ____, ____, methods for determination of, 2491, 2769
____, filtrate factor (pantothenic acid),
____, ____, in foods, 2709

Vitamin C (ascorbic acid, cevitamic acid),
____, added to foods before freezing, 2149, 2170, 2398, 3072, 3184
____, ____, to retard oxidative enzyme activity, 2144, 2366, 2399, 2426, 2580, 2817, 3000, 3097, 3123, 3125, 3160, 3187, 3190, 3228, 3257, 3279, 3282, 3294, 3302
____, as related to color maintenance, 2399, 2820, 3097, 3160
____, as related to organoleptic qualities, 2580
____, during preservation of foods, 2195, 2443, 2444, 2706
____, effect of blanching on, 2161, 2394, 2706, 2751, 2775, 2919, 3215, 3277, 3286
____, effect of cooking on, 2566, 2567, 2706, 2738, 2775, 2803, 2993, 3215
____, effect of dehydrofreezing on, 2675, 2918, 2920
____, effect of prefreezing treatment on, see also Vitamin C, effect of blanching on, 2387, 2631, 2706, 2751, 2803, 2993, 3215
____, effect of storage on, see Storage, effects on vitamins
____, effect of SO_2 treatment on
____, ____, compared with blanching, 2751
____, effect of thawing on, 2706, 2775
____, in foods, 2566, 2631, 2709, 2810, 2850, 2993, 3121, 3215
____, ____, methods for determination of, 2178, 2396, 2398, 2443, 2706, 2775, 2803, 3088, 3089, 3090
____, to prevent oxidative enzyme activity, 2399, 2820

Vitamin G, see Vitamin B group, vitamin B_2

Vitamin P-P, see Vitamin B group, P-P factor

Vitamins, see also under various types of foods and under specific items
____, changes in, 3034
____, effect of cold and freezing storage on, 2523, 2803, 3180
____, in frozen foods, 2255, 2432, 3035
____, ____, effect of blanching on, 2523, 2802, 2803, 2879, 2916, 2917, 3180
____, ____, effect of cooking methods on, 2443, 2444, 2803, 3180
____, ____, effect of freezing on, see Freezing, effect on vitamins
____, ____, methods for determination of, 2567, 2961, 3126
____, ____, ____, microbiological compared with chemical, 2491
____, increasing of, 3034
____, occurring naturally in foods, 2432, 3076
____, retention of in foods, 2523, 2525
____, ____, during various methods of preservation, 2420, 2432, 2803, 3034
____, solutions of,
____, ____, frozen, 3126

Waste utilization,
___, from fish freezing, 2487, 2922, 3319, 3375
___, from food freezing, 2561, 2864

Whale-meat,
___, frozen, 2231, 2232, 2371

Wine,
___, made from frozen fruits, 2641

W

Yeasts,
____, fermentation by, 2641
____, in frozen eggs, 3115
____, in frozen foods, 2182
____, ____, most frequently isolated, 2680
____, in frozen fruits and vegetables, 2544

Youngberries,
____, frozen, 3192

Y

Z

"Z" processes, see Zarotschenzeff processes

Zarotschenzeff processes, 2922, 2949, 2980, 3314, 3315, 3316

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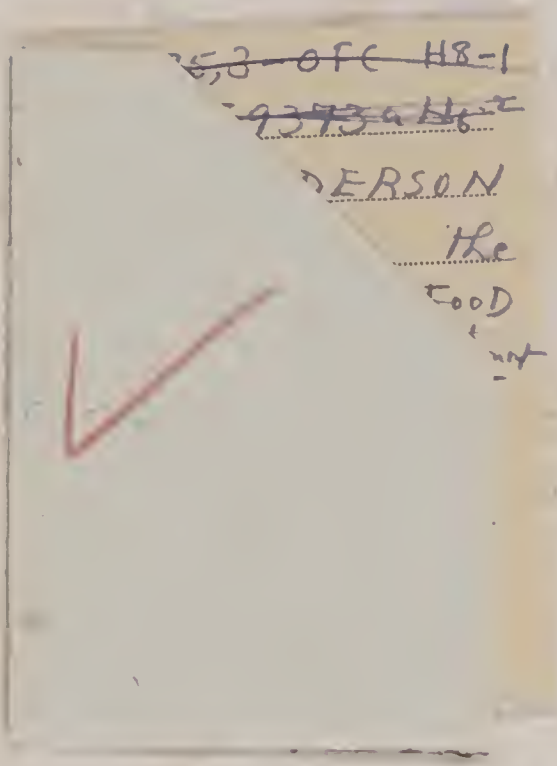
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